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East Europe Report

ECONOMIC AND INDUSTRIAL AFFAIRS

No. 2201

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CONTENTS

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BASIC RESEARCH SEEN AS KEY TO PRODUCTION SUCCESS

Hager: Higher Standards Needed

East Berlin EINHEIT in German Vol 36 No 8, Aug 81(signed to press 9 Jul 81) pp 748-760

['Science in Our Society' feature article, originally a lecture at Freiberg Mining Academy given on the occasion of Miners' and Foundrymen's Day, 23 June 1981, by Kurt Hager, SED Politburo member and Central Committee secretary for culture and science: "Science and Society"]

[Text] Proceeding from the functions of science in socialism, the impulses for its development and the entirely new qualitative relations between production and science today, the article deals with fundamental conditions for the needed acceleration of scientific-technical progress, especially with basic research strategy, the correct development and use of the research potential and the further development of scientific creativity. Through a polemic against theories hostile to progress, in capitalist countries, the article explains our position on science as shaped by socialist humanism.

The 10th SED Congress resolved to continue our program on economic growth, full employment, people's prosperity and stability. Further improving the people's material and cultural standard of living is and remains the main task, which finds its striking expression in the unity of economic and social policy.

We do not fail to see that this calls for great efforts. The more complicated foreign policy and foreign economic conditions and the need to tap all domestic resources led to a change in the economic reproduction conditions late in the 1970's and call for greater effectiveness in our intensively expanded reproduction. Primarily they demand a higher speed and a comprehensive use of scientific-technical progress. Further shaping the developed socialist society in the GDR in economic, social and cultural respects today depends largely on our ability to use, and also to determine in fact, the results of the scientific-technical revolution.

If science capacity is to be fully placed in the scale in socialism, it calls for an active and initiative-rich conduct by all who work in science--in R&D as in teaching and training.

By preparing the 10th party congress, the scientists in our republic have demonstrated anew their awareness of their responsibility for the continued shaping of the developed socialist society. They exercise this responsibility in research, culture and the communist education of youth, in shaping the material-technical base of our economy, in developing our intellectual-cultural life and through contributions meant to safeguard peace. At the 10th party congress they have received thanks and recognition for these great achievements from Comrade Erich Honecker, general secretary of the SED Central Committee and chairman of the GDR State Council. Our party places great trust in the scientists in the combines, academies, universities and colleges. But it also combines this trust with great expectations.

The SED Program says about the meaning and purpose of science in socialism: "Science makes a constantly growing contribution to systematically perfecting our production and developing the material and intellectual-cultural life of all working people. It promotes the welfare, health and intellectual needs of men in socialism. SED policy thus is aimed at developing science systematically and over long range, so that its progress-promoting and humanistic character can fully come into its own."[1]

In combination with technology, science is a productive force. At the same time it is essentially a social and intellectual-cultural force. All these functions have to be taken account of and be connected with one another. Socioeconomic effects of scientific-technical progress, for instance, must not be disregarded. The social sciences--philosophy, history and so forth--are indispensable because they, after all, make us understand the inevitabilities of social development, including the inevitabilities in science development, and they reveal to us the meaning and purpose of human action. Thus we always look at science in its totality and in its specific terms. There emerges more and more strongly at present the unity between the social, the natural and the technical sciences, which derives objectively from the unity of the material world, the inseparable connection between nature and society. The need to take account of this unity consciously through interdisciplinary efforts derives from the complexity of scientific and social problems and the mutual fertilization of the sciences.

Science development has its own dynamics and a relative independence, in as much as engaging in science is itself a social need of the first rank. Without joy in cognition, inexhaustible curiosity and the search for truth, without creativity, imagination, intuition and iron industriousness, science would be impossible. Were it not governed by the urge to contribute to making people's lives richer and more beautiful, it would be useless.

Yet science development, as all cognition, proceeds under the concrete historic conditions in any form of society in which one engages in science. The inevitabilities of science development are primarily based on social requirements, and science itself is an active, propelling element of social development. The place of science in society and the ways and means in which the data of scientific and technical creativity are used--this is taught us both by history and our present age--depend exclusively on the social conditions, the prevailing production relations, the main targets and motives of production, the basic interests of the proprietors of the means of production.

Impulses for Scientific Progress

Historical materialism has brought the evidence that it is mainly the demand of production for improved or more perfect new technical and technological solutions and the boosting of development in the production relations and other social relations that set in motion and impel the development of the sciences. Engels wrote that "from the outset the genesis and development of the sciences were caused by production."[2] And elsewhere he wrote: "If society has a technical need, that impels science more than ten universities."[3] This remark by Engels suggests what special role within the aggregate of social needs attaches to the technical needs in science development. Technical problems and requirements directly reflect the given status of the productive forces. To become effective as a real impetus to science development, to be sure, the technical need has to conform with the basic interests in a given mode of production and its ruling class, i.e., it is governed by social and economic needs.

This connection between technical needs and science development can be illustrated by the history of the Freiberg mining academy. Mining, which assumed industrial features and a pronounced division of labor even way back, on the threshold to the capitalist mode of production, came to face technical problems when operations expanded and mining went deeper which could not have been done without systematic cognitive penetration. Thus scientific mining, even in the 16th century, evolved as a prototype of what would be termed today an industrial branch-oriented science complex in which even at that time the science of mineral deposits, mineralogy, mining and mine surveying, for instance, had a place. The members of the mining academy who, in the attention they give to their own traditions, could serve as a model for many other science facilities in our republic, are justly proud that in their own town the first mining textbook was printed around 1500, Ruelein of Calw's "Nuetzliches Bergbuechlein" [Useful Little Mining Textbook]. Even a quick glance at the structure of scientific mining as it arose teaches us that was no pragmatic enterprise to satisfy immediate production needs. Already there was the germ for the whole range from fundamental natural science to direct efforts about procedures and technical means. So it was indeed suggestive that the humanist Agricola, a man with classical education, combined his knowledge of ancient and traditional thought with knowing precisely what the concerns of mining in his age were all about and held a central place in the emergence of mineralogy as a science.

Specifically, the roots of science as a productive force historically go back far into the past if we consider astronomy and geometry, for instance. Actually science became productive as soon as it evolved. But not until our own century have production and science gained a dimension that has led to a fundamental change, a completely new quality of their reciprocal relations.

For one thing, fundamental changes took place in science itself, from the expansion of its range of knowledge to its organization and material-technical base. They lent an industrial character, as it were, to the business of science.

During the last three centuries modern science has developed to such an extent that it dominates our everyday life with its data today. In their book, "Dialogue With Nature," Prigogine and Stengers write: "Science has developed incredibly fast and permeates all our lives. Our scientific horizon has expanded at a veritably

phantastic range. In the microscopic field the physics of fundamental particles explores processes that involve physical dimensions at the magnitude of 10^{-15}cm and time factors at the magnitude of 10^{-22}seconds. On the other end of science, cosmology leads us to ages of the magnitude of 10^{10} years, the so-called age of the universe. Science and technology are entwined as closely as never before. New biotechniques and advances in information processing promise radical changes for the life of our society." But this is, as the authors rightly note, not just a quantitative growth of our knowledge, but these are qualitative changes: "The picture of nature has changed fundamentally--toward the manifold, the time-conditioned, the complex."[4]

Second, there is the transition from a single to a massive application of science data.

Today science literally affects all domains of public life. Even art is no longer only subject to aesthetics. Natural science methods are used there more and more extensively, for instance to determine the age of art objects, and electronics has a place in music and, particularly, in entertainment arts.

Third: while formerly science mostly explained and perfected experiences acquired in practice ex post facto, that relationship has now been reversed.

In the early 17th century, the English philosopher Francis Bacon wrote about the mechanical arts--as he called crafts and technology--: "as if they were full of vitality, are continually thriving and growing. Under the hands of their first founders, they mostly appear still rude, clumsy and formless; but then they gain new advantages and more convenient arrangements and designs."[5] Compared with them philosophy and the rational sciences were esteemed and celebrated as idols, to be sure, but received no noticeable increase. The only remedy could be, according to Bacon, "that one would approach things by new methods, in the noble intention to arrive at a complete renewal of the sciences and arts and of all human scholarship altogether on assured foundations."[6]

The program announced by Bacon was that of modern experimental natural science. The renewal of scholarship, the thorough exploration of nature and society through which man discovered himself and his environment, has brought it about that today to an ever increasing extent from the discoveries and inventions of science themselves new products, procedures and methods arise which often are not directly accessible to human experience or under the greatest difficulties only. Examples are nuclear technology, electronic computer technology, laser technology, microelectronics, genetics engineering and so forth. These new techniques have their origin in the great scientific achievements which all go back no farther than 50 years and which in their totality constitute the scientific-technical revolution that developed in the second half of our century and constantly gains in dynamics.

The processes of the scientific-technical revolution--mainly the development of microelectronics, robot technology, electronic data processing and electronic guidance systems--more and more put their stamp on the overall process of our scientific-technical progress. The increasing speed of scientific-technical progress observed worldwide for several years is attributable to impulses emanating from those developments.

Speeding Up Scientific-technical Progress

Our speed-up course for our scientific-technical progress is caused by the need to take account of the altered reproduction conditions, the higher prices for energy and raw materials, for instance, and simultaneously by the greater objective opportunities to make our economy grow further through scientific-technical progress. The altered qualitative role of science vis-s-vis production finds its compact expression in that now, as the status report by the Central Committee to the 10th party congress asserts, "the opportunities of the scientific-technical revolution have at once become the chief reserve for our economy's performance growth and efficiency."[7]

It is imperative that the revolutionizing scientific-technical transformations proceed in all directions of our advances in effectiveness at one and the same time: they make possible extraordinary increases in labor productivity while jobs are being saved and important savings in energy and material. Precisely because of that they conform to the efficiency growth criteria for the 1980's, which call for mighty economic progress simulataneously in all directions. The Central Committee status report to the 10th party congress states: "The saving of labor time must not come at the expense of increased investment efforts, nor must material be used economically at the expense of quality. To do one thing or another is not enough. Saving live labor and material, making better use of basic assets and investments--only thus combined will we reap the yield we need."[8]

Typical of the processes in our scientific-technical revolution--and this significantly distinguishes them from revolutionary technical transformations in previous decades--is that they presuppose high scientific-technical results in very many science, technological or production areas but with it also show an extraordinarily broad field for application. Many areas of human labor even become now only accessible to technization through microelectronics and data processing. The same is true of many activities in the non-producing areas, the services, the production preparation areas and the management and planning processes. Systematically opening up the fields of application to microelectronics, robot technology, data processing and biotechnology, and the purposeful and responsible cooperation among the producers and users of these technologies no doubt is one of the most important fields in which the advantages of our socialist planned economy have to face their tests at the present time and in the immediate future.

A great role is played here by the industrial and construction combines which embrace the essential elements in the process of intensively expanded reproduction. That affects positively the shaping of more efficient and more long-range cooperation relations between science and production and the determination of research priorities. In purposefully combining the science potentials of the combines, the Academy of Sciences and other academies, the universities and colleges we find a decisive task for the further development of science and technology in our republic. This task is an essential aspect of our science policy. It must be coped with assiduously.

The Freiberg Mining Academy has for years been a spur to the cooperation among industrial research, universities and academy institutions. The cooperation between science and production has become closer and more effective in recent years. The system and methods of the management of our scientific-technical progress have been further developed.

Interdisciplinary cooperation provides considerable potentials for advances in specific sciences and for developing the science disciplines in their entirety. It is a source for new insights and fruitful interplay. More use should still however be made of its opportunities for promoting scientific opinion exchange and for providing university and technical school personnel with advanced training. Nor have we as yet succeeded sufficiently in ensuring the requisite complexity in determining and solving the tasks and in the practical application of research data.

Another favorable aspect of our science development is the comprehensive, division-of-labor cooperation between the GDR research institutions and those in the fraternal socialist countries, especially in the Soviet Union. That is shown, among other things, in our multilateral cooperation in semiconductor physics and molecular biology. Such multilateral research cooperation also is found beneficial in the economic field and in other social science endeavors. There are still reserves to be tapped for these international cooperation relations through careful planning and coordination.

Basic Research Strategy

Through the economic strategy developed at the 10th party congress we have a clear concept for the growth of social production and thus also for the basic requirements for science and for essential fields in our social and intellectual development. Much of our scientific work serves the implementation of a high efficiency growth for the benefit of the people. The critical problem is to select those trends in scientific-technical progress that best conform with the development requirements and concrete conditions of our country within the framework of the socialist community. It is constantly necessary to translate them into research, development and investment strategies, short and medium-range plans and, eventually, into successful implementation.

The main lines for this development are set down in the research conceptions and in the 1981-1985 five-year directive issued by the 10th party congress. The conception for a long-term development of basic natural science and mathematics research and basic research in selected technical fields goes back to 1974. It is constantly made more specific and elaborate. Together with the development conception for medical research and other conceptions, and with the central social science research plan, our basic research strategy conforms with our social and scientific requirements. At the same time, the long-range tasks for important research fields do most closely relate to our GDR-USSR cooperation. The agreements concluded about that ensure that GDR science can still more successfully contribute in accordance with top international standards in the future.

It has been practically demonstrated how correct it was to determine long-range goals and tasks for basic research. It has helped in systematically expanding the basic scientific research potential and in concentrating on priorities posed by our economic and science development. That is confirmed by the results obtained in microelectronics, energy physics, raw materials research, microbiology and the science of nutrition.

The long-range basic research conception also has had beneficial effects on the cooperation relations among the Academy of Sciences, the university system and the combines. It has provided basic research with more objectivity and certitude. This cooperation stimulates the research process. Take, for example, the main research field of nuclear physics which is handled jointly by the Rossendorf Central Institute for Nuclear Research, the Freiberg Mining Academy and four other universities and colleges. Within the framework of the raw materials research cooperation community, academy institutes and sections in several universities are handling extensive research topics on primary materials.

Already now must basic research prepare the scientific-technical top achievements we need for producing new high-grade commodities and introducing in production in the 1986-1990 period and up to the end of the century new highly efficient technologies and procedures. Experience has shown a strategic research orientation is impossible without a constant analysis and prognosis of the scientific and technological developmental trends at an international scale as well as domestically. That makes possible establishing research priorities in line with the tasks and targets in the further shaping of the developed socialist society. That also includes the listing of alternatives, probability assessments for specific solutions and estimates for the application of scientific-technical data.

To improve further the inferences and correlations for the long-term target and task requirements of basic research in the combines, academies, universities and colleges, and to speed up at the same time the application of data in production, more cooperation among combines, academies, universities and colleges in elaborating long-term development strategies is imperative. Then we will also succeed in elaborating more tenable basic science requirements in line with the development requirements of production and in getting results which can become the points of departure for new lines of development or entire application areas of decisive importance for the level of production and for social progress.

That applies particularly to those directions in our scientific-technical progress that serve assure our energy base and its rational use, the speed-up of the development and broad application of microelectronics, the safeguarding and rational use of our raw material base, the production of highly refined chemical products, and keep our population well fed and healthy.

A crucial condition for economic growth in the GDR lies in further strengthening our energy and raw material base. The development of our energy base mainly relies on raw lignite and the gradual expansion of nuclear energy, since it obviously is the most rational. The main way to guarantee energy supplies for the GDR economy is the rational use of energy sources. A continued systematic geological exploration of GDR territory, in which the mining academy has a great share, will further expand our raw material base. The mining academy also contributes through its research to getting more rapidly a practical use out of the available mining waste dumps.

One scientific research priority at our academies, colleges and combines is the optimum refinement of energy sources, raw materials and working materials. That calls for novel and better technologies by which, through high labor productivity, products with high intrinsic values can be made. Important for chemical industry mainly is an enhanced refinement of petroleum products, of the coal-carbide chemistry products, and of plastic and synthetic fibre, for electrical engineering and electronics, an optimum refinement of ferrous and nonferrous metal products and synthetic commodities and a significant improvement in the cost/benefit ratio.

Of special importance in economically focusing on science and technology is a comprehensive use of the substances contained in the raw materials and a greater use of secondary raw materials and less valuable domestic raw materials. Implementing the high targets assigned in the 1981-1985 five-year plan calls for much improvement in the effectiveness of science and technology in all fields that are important to the energy and raw materials economy.

Another field of social progress that challenges science at its full range, as it were, is a comprehensive socialist rationalization and more automation, especially through the development and application of microelectronics, robot technology and scientific labor organization. The intended production boost for highly integrated solid-state circuits--microprocessors and storage circuits--, the expansion of the total number of basic technologies used, and the improvement in the efficiency of circuit production place high demands on R&D. That must ensure the scientific lead time for industry, including its ancillary enterprises, and the procedure development for creating new basic technologies, including the development and construction of laboratory and test models for equipment enterprises, and solve other tasks.

The use of industrial robots facilitates a much higher production rate while keeping the quality of production intact, reducing the number of rejects, and releasing manpower. That thus assigns an important spot in our economic strategy to the production and use of industrial robots. A special priority for speeding up the introduction of robot technology is rapidly creating the necessary scientific-technical prerequisites and the combines improving the achievements in their own construction of means of rationalization. That addresses itself to many different scientific fields. And so, along with scientists and students of technical and social science departments in Dresden's Technical University, other colleges and institutes, including the Academy of Science, are also taking part in the effort of "industrial robot application preparation."

In the 1980's and the decades thereafter the whole field of data processing and coming out with modern information techniques will assume increasing importance. This is a challenge to science and technology, as we are only at the beginning of developments in this field which, if properly managed, will provide us with considerable social progress.

Of great importance finally are the science contributions to providing the population with healthy food, to preserve, foster and rehabilitate men's health and capacities, and to preserving and improving environmental conditions.

The role science has in the socialist way of life is unmistakable. It includes health, nutrition, but also attitudes in the broadest sense, modes of thinking, insights and so forth. As far as science is concerned, it must not only produce knowledge but must, measured against our current conditions, spread scientific knowledge among the public as well to a larger extent. Familiarizing broad circles of the population with the targets, tasks, results and consequences of science is a responsibility the scientists themselves must principally bear.

Integration of Science and Production

For effectively combining science with production and rapidly applying scientific-technical top achievements in production, as we need them to implement the 10th party congress decisions, there are mainly two crucial conditions that have to be further improved expediently. One is the further construction and expansion of branch-specific basic research in the combines and the other one, further boosting the application maturity of the data coming out of the academies, universities and colleges.

The higher the level of the combines' branch-specific basic research, the more accurate can become the industrial demands on priorities in academy, university and college research, and the more improvement there is in the opportunities for applying research data of international rank in production rapidly. The social and thus also the eocnomic effectiveness of science is increasingly controlled by the time factor. That concerns the termination of research projects and their technological implementation and it concerns the acceleration of the whole cycle in all reproduction phases. Together with research, the absorption capacity of production for science data and, in particular, its reaction capability to unexpected but propitious developments must be greatly elevated.

Science and production are the critical elements in the social reproduction process which increasingly become entwined in a dialectical unity and release its revolutionizing capacities. That makes it so important to get a better hold on the unified process from gaining knowledge to applying it fast to production. Greater attention is required there for the transitional phases from basic research to applied research, from applied research to technical development, and from technical development to the introduction of the new products and procedures.

We must still have more success in the management of scientific-technical progress in ensuring the unity of interests and the activities of all partners while paying full attention to their specifics.

The 10th party congress demands come down to achieving an ever more complete integration between science and production. That is not likely to become possible without surmounting certain disciplinary and institutional barriers.

Scientific Creativity

Our party, the workers class and all our people place high and demanding expectations on the scientists' work. They are a challenge to an optimum level of scientific creativity, the scientists' commitment to their social mission in socialism, to performance readiness and performance capability.

The common resolve by all, without exception, who are in involved in R&D, teaching and training, to work as best they can for our society is the source for comradely cooperation, great initiatives and stable solutions for making our scientific-technical progress prevail. The better a collective knows its very own responsibility to the whole, that cannot be delegated to any other collective, the higher will then be the level on which scientific-technical solutions are made to agree with the possibilities of their technical-economic realization.

Economic inducement measures, legal regulations and organizational forms must of course keep pace with the changing conditions of scientific-technical progress, yet by themselves they never can guarantee perfect solutions. The scientific work and research process must always be tested critically and self-critically, because science tolerates no stopping, no mediocrity, no routine. There have been and there are many discussions about what to think of scientific achievements in the science institutions. Mediocrity in teaching and research, it seems to me, can effectively be countered only where the managers of science institutions or collectives set the highest standards--which have to pertain also to their own work--and where such standards also rate consistently as the work norms in those institutions.

Necessary also is thoroughly analyzing the status achieved in each individual science collective, implacably measuring results achieved against world standards, so as to assume the correct starting position in the struggle for scientific top achievements in each institution with objectivity and realism, tolerate no whitewash and--where it is the case--force back any presumption of imagined world standards. No doubt, it cannot always be easy for a scientist to place his own results, laboriously accomplished, and often under constraints, on the test stand for international comparison without being emotional about it, yet without such integrity there can be no progress in science. In some institutes in the USSR and in other countries, scientists must face tough tests in accounting for and defending their projects before they are provided with funds. In some countries researchers or their working teams even have to defend their ideas and projects in front of a group of international experts. Only thereafter the decision is made whether they are to receive continued material and personnel assistance. Many of our own science councils, whose main function it is to connect the development of their science field with our social development, regard it as an essential task to enforce such tough yardsticks in their own fields of activity. The science associations also ought to be engaged still more actively as observers and custodians of high sensitivity for new scientific and technical trends and high performance criteria. Through the cooperation among the science institutions socialist competition unfolds which decisively helps carry on the needed high criteria from the top achievers to other partners.

This also is the spirit in which we should continue to implement the March 1980 SED Central Committee Politburo resolution on the "tasks of the universities and colleges in the developed socialist society." In this resolution and at the Fifth University Conference it has been confirmed that the training and education of the students on a high technical level and in the spirit of the Marxist-Leninist world-outlook is the fundamental task of the universities and colleges. The students and our junior scientists should have acquired the latest scientific knowledge,

applicable knowledge and skills and an abundant intellectual-cultural education. They must be induced to seek highest achievements always because on that depends the effectiveness of their studies as does their scientific activity.

In other words: standards are established for training and education that take into consideration the growing demands the graduates will face in their future activity, in their occupation and in their public life. This way the state of knowledge, the political maturity and the work ethics of the graduates can be made to conform with the constantly growing demands for performance. Instilling lofty work ethics will be all the more effective, if the instructors themselves have practical work experience and know the practical requirements, especially those placed on the economy.

At the fifth university conference the need was emphasized to involve the students gradually in the solution of research tasks and to enable them to follow their own, and new, ways in research. A position taken on that by the Academy of Sciences rightly pointed out that this must be genuine theoretical and experimental research because certain things are learned during studies, such as book reviewing, literary surveys and seminar projects, that cannot as such be considered research. That would give rise to wrong ideas and an uncritical attitude toward scientific work. Further perfecting studies as a productive phase thus demands that higher standards are applied for research already during training. It demands that tasks be formulated there that are to be solved under one's own responsibility, tied to the knowledge and skills acquired yet leading beyond that in their objective. This conforms to the students' individual potentials and fosters the development of their creative capabilities and performance capacities.

Science and Humanism

Work in all these processes of training and research, and in the development and introduction of technical innovations can meet with success only if its purpose is understood and it is integrated within domestic and foreign policy contexts, the 10th party congress strategy for the further consolidation of our socialist state and of the socialist community, and the struggle for the preservation of peace. The elucidation of these contexts also demands considerations about how to improve their effectiveness in the social sciences, basic Marxist-Leninist studies, the political-ideological party work, the socialist youth association, the trade unions and all other social organizations.

Productive force is generated mainly through a massive application of knowledge but also of experiences. The decisive role in this sense is played by man, who creates and applies knowledge, creates and applies technology, produces and consumes. The responsibility of science for scientific-technical progress and for high labor productivity in socialism always relates to man, to improving his material and cultural standard of living and his development as a personality. That addresses not only the natural sciences and technical disciplines but all the science disciplines in toto.

That is our socialist position on science, the position of socialist humanism. Under socialist production relations science is not only a productive force but a means for realizing our humanistic ideals, for developing the socialist way of life and its personality. For that reason science pessimism and hostility to technology can find no fertile soil among us.

But those theories which ultimately oppose all progress have once again been blossoming in capitalist countries in the last decade. In those countries they are more and more talking about a confidence crisis vis-a-vis science and technology, often placing in doubt the use of science for the progress of humanity. An "anti-science movement" has become a political fact which combines in itself, in a manner that is tough to disentangle, impotent protest, fear, sophisticated manipulation and sensationalism. The key problem in this anti-scientific temper is that science is being blamed for injuries which have their sole origin in the social system.

We, in contrast to that, by using the advantages of socialism, are tackling the problems and contradictions any progress brings, all the more so the stormy processes of our social changes and of the scientific-technical revolution. The economic and social evaluation of technological developments, the elaboration of comprehensive programs for scientific-technical, economic and social development, have become an important instrument for the planning of social processes. More than ever before there appears a need here to anticipate and assess immediate and remote effects and desirable and undesirable consequences of technical innovations. Friedrich Engels wrote: "While it has taken the effort of millenia for us to learn somewhat to figure out the most remote natural effects of our actions aimed at production, it was still much more difficult with regard to the more remote social effects of those actions."[9]

Socialist development in the GDR most clearly demonstrates that the spread of microelectronics, for instance, contributes to a constant growth rate in our intensification and rationalization potential. Yet the working people are not subject to some "microelectronics syndrom," and microelectronics applied does not become their "job killer." We possess the social premises for confining, or even eliminating, undesirable effects on behalf of the working people. The scientists have the mission to predict them as early and as well as possible and--if not yet in place--to create scientific and technical data by which such effects can be met before they become dangerous. The trust in science and technology in our society is well justified.

Social processes are taking place in our 20th century that are changing the world: the social revolution and the scientific-technical revolution. Mankind is seeking new shores. That is also illuminated by the transition from capitalism to socialism, the national liberation movements and the social conflicts, the exacerbation of the class struggles and the conflict between war and peace. At the same time fundamental changes are taking place in the role of science in society, its effects on technology and technological development, on working and living conditions and on all socioeconomic relations as such. These processes are not mutually independent but they affect each other. The triumph of socialism in the Soviet Union, the GDR and other countries, the shaping of the developed socialist society and the creation of prerequisites for the gradual transition to communism were affiliated with science from the outset. Because socialism is established in conformity

with scientific insights worked out by Marx, Engels and Lenin, its construction proceeds according to plan by scientific planning and management methods. Essential principles for it are worked out by the social sciences, mainly by Marxist-Leninist philosophy and the economic sciences. The resolutions by the working class party--as the resolutions of the 10th SED Congress--are based on the sure foundation of scientific analyses and insights. The strategy on the further development of socialist society is the outcome of scientific deliberations and elaborations. Then also, science through these social changes receives new dimensions and operational opportunities. For the first time in history it is rid of the chains of restraints imposed on it by social relations relying on feudal confines or capitalist profiteering and competition struggle. In socialism it can unfold freely for the good of the people, effect the improvement of the people's material and cultural standard of living, and fully bring its inherent potentials to bear.

The social and the scientific-technical revolution fertilize each other. Social changes push science and technology ahead and lend constantly new impulses to them. Science and technology in turn affect the socioeconomic conditions, the changes in the production relations, the way of life and the development of personality.

Science and technology even so do not remain unaffected by the conflict between the two social systems, the contradiction between socialism and imperialism. The confrontation course taken by the United States and the NATO states for achieving military superiority over socialism, and the psychological warfare that goes with it, tie up an enormous research potential for armaments purposes. They also compel the Soviet Union and the other socialist countries to increase their efforts for the defense of peace and of the socialist achievements by means of science.

The peace policy pursued by the Soviet Union and the other socialist states, aimed at stopping the arms race and at effective disarmament steps, would give science the chance to concern itself primarily with the safeguarding of peace and with research on the development of men's working and living conditions, the protection of the environment and other global problems. It would also open the gates wide to science and technical progress for the developing countries. The world--and science--would lool different if--as was found at a Vienna conference on "science and technology in the service of development"--40 percent of the worldwide research resources were not to be spent on armaments research.

Science senses the exacerbation of the international situation also by the designs of imperialist circles to limit the exchange of scientists and the transfer of technologies, which is against the Helsinki accords.

We find the humanistic responsibility of the scientists in our country in their doing what they can to prevent nuclear war and to preserve and secure peace by way of arms limitation and disarmament.

In their appeal, "To the Scientists of the World," noted Soviet scientists have declared: "The situation that has emerged, in our view, demands new resolute actions by scientists on behalf of peace. Mankind must not be permitted to remain under the spell of prejudices as if peace would have to rely on heaps of weapons and not reason but strength would direct the course of history for all eternity. To accept that would mean taking for granted that war, and hence a devastating nuclear war, is unavoidable."[10]

The GDR research council endorsed that appeal by its 8 May 1981 announcement. It has unanimously approved the peace proposals of the 26th CPSU Congress and the 10th SED Congress and has appealed to lend support to that peace policy by great scientific-technical achievements for strengthening the GDR economy. The progress-promoting and humanistic essence of science in socialism finds its supreme expression in the struggle for peace and the consolidation of socialism.

FOOTNOTES

1. "Programm der Sozialistischen Einheitspartei Deutschlands," Dietz publishing house, Berlin, 1976, p 45.

2. Friedrich Engels, "Anti-Duehring," Karl Marx/Friedrich Engels, "Werke" (Works), Vol 20, Dietz publishing house, Berlin, 1962, p 456.

3. Engels to Starkenburg, 25 January 1884, Marx/Engels, "Briefe ueber 'Das Kapital'" (Letters About "Das Kapital"), Dietz publishing house, Berlin, 1954, p 365.

4. Ilya Prigogine /Isabelle Stengers, "Dialog mit der Natur. Neue Wege naturwissenschaftlichen Denkens" (Dialogue With Nature--New Ways in Natural Science Thought), Munich-Zurich, 1981, pp 9-10.

5. Francis Bacon, "Novum Organum," edited by Manfred Buhr, Akademie Verlag, Berlin, 1962, p 8.

6. Ibid., p 4.

7. Comrade Erich Honecker, "Bericht des Zentralkomitees der Sozialistischen Einheitspartei Deutschlands an den X. Parteitag der SED" (SED Central Committee Report to the 10th SED Congress), Dietz publishing house, Berlin, 1981, p 49.

8. Ibid., p 55.

9. Friedrich Engels, "Anti-Duehring," loc. cit., p 453.

10. NOVYY MIR, No 19, 1981, p 5.

Need for Investment Restructuring

East Berlin EINHEIT in German Vol 36 No 8, Aug 81 (signed to press 9 Jul 81) pp 761-769

['Science in Our Society' feature article by Prof Dr Helmut Koziolek, economist, member, SED Central Committee; director, Central Institute for Socialist Economic Management, SED CC; chairman, Economic Research Council; member, GDR Academy of Sciences; member, EINHEIT editorial board: "Economic Strategy and Development of Science." A translation of the Guenter Mittag article cited in footnote 2 is published under the heading, "Mittag Urges Combines to Economize, Raise Production," in JPRS 78885, 1 Sep 81, No 2167 of this series, pp 64-76]

[Text] The basic feature that controls our party's economic strategy consists in taking another step toward combining the advantages of socialism with the scientific-technical revolution. How is, in particular, the country's intellectual-creative potential being used to that end? Which main trends in science development have been set down in proceeding from the continuing speed-up, wordwide, of the scientific-technical revolution and the social exigencies and requirements?

Smoothly carrying on with our main task, and high economic performance boosts needed to secure and further extend what has been achieved, call for the working people's skilled and creative work, industriousness and initiative, as well as mainly also an important upswing in science and technology, the accomplishments of which more and more pervade, and place on a new foundation, our country's whole economy. The economic strategy, as explained by Comrade Erich Honecker at the 10th party congress, which is oriented to the far distant future and makes high demands on the socialist economy at the present, is in every way responsive to it.[1] It outlines the framework of the productive forces for the continued shaping of the developed socialist society and explains the direction in which socialist production relations have to be perfected so as to make use of the advantages of our social order based on them and release mighty impulses for social development. The further extension of these advantages is indispensable for the prosperity, dynamics, effectiveness and vitality of socialist society, and they are: unified leadership in social development by an experienced Marxist-Leninist party; socialist production relations freed from exploitation; the planned, proportionate development of society, which includes the rational use of assets and social labor capacity; process management by the socialist state power on the basis of democratic centralism; and our inseparable linkage with the community of socialist states, especially with the USSR.

Our party has proven its creative approach to the social requirements and tasks it faces to a large extent by the fact that it has never regarded these advantages as something static, as given for once and for all. It has let itself and is letting itself be guided by that the realization of all the enormous potentials inherent in socialist society requires a policy that always conforms with the ripening of conditions and offers clear statements on our targets, always taking into account that changed conditions call for new ways to realize those advantages. Consider, for instance, how our production relations are used and perfected to implement the main task in its unity of economic and social policy to conform consistently with the direct connection between labor and the satisfaction of needs. Consider that in the process of scientific-technical progress and comprehensive socialist rationalization the working people must meet the growing requirements placed on the cooperation and combination of the various partial activities to achieve great effectiveness in the total social effort. Think of the combines or agro-industrial associations as those higher organizational forms of socialist property through which the productive forces are propelled significantly due to the direct ties between science, education and production. Remember that planned economic development today manifests itself, among other things, in making much better use of available resources on behalf of society by means of enhanced refinement of raw materials and working material and, in particular, by a more effective use of the social labor capacity due, in particular, by socialist rationalization. Let us also remember that within the cooperation in the community of socialist states, especially with the

Soviet Union, considerably higher demands have now arisen in the scientific-technical field and the specialization and cooperation that come with it. And then above all let us also remember that the use of these advantages must come through a highly dynamic process always integrated within overall social policy in which new requirements, for example, impose themselves on socialist state power. The main thing that matters today is to perfect all management activity by strengthening democratic centralism and to practice, for example, forms of more expert ministerial and combine collaboration.

Economic Efficacy Through Modern Science

Through its ten interconnected key points our party's economic strategy is the scientifically established conception for GDR economic development in the 1980's. Thereby it is the stable foundation for the further shaping of all of socialist society in our country, a conception for strengthening socialism all-around, and a contribution to raising the political authority and attraction of real socialism and to the safeguarding of peace. Its pervasive fundamental feature that dominates everything is to find a constructive response to the altered requirements by which the main task in its unity of economic and social policy can be smoothly carried on in the 1980's.[2] Accordingly, its starting point then also is the demand for a new step in combining the advantages of socialism with the achievements of the scientific-technical revolution. Precisely this is the key for intensively expanded reproduction today and in the future, the various sides, targets and conditions of which have been outlined by the economic strategy.

We can take another step in combining the advantages of socialism with the scientifi-technical revolution only if the large intellectual potential of our society on the whole is aimed at the acceleration and the high effectiveness of the scientific-technical revolution and this finds its expression in our concentrating on new products and procedures. Social and economic benefit must today be the centerpiece of our scientific requirements, as scientific and technological advances more deeply pervade men's ordinary lives in our country, the conditions of their work and life, and any serious elevation of the productive forces has its roots in scientific knowledge. That is why it is so important largely to concentrate research on an effective use of our domestic raw material base and on modern procedures and technologies that are so broad in their efficacy that economic efficiency depends on them. With that, this also is the way to boost our labor productivity significantly. Through scientific-technical progress and our socialist rationalization we have to achieve larger production dimensions with less manpower so that we can gain working people for other, urgently needed activities. Boosting our labor productivity mainly means fully applying the high educational potential of our society. This is the result of the highly developed social all-purpose worker, of man as the chief productive force.

Scientific-technical progress and higher labor productivity, mutually interrelated, must find their most striking expression in that raw materials and fuels are by far more highly refined. A function of skilled labor in socialism is to produce from raw materials and energy as many high-grade products, in accordance with the satisfaction of demands, as allowed by the utilization of the most up-to-date natural science data and an optimum organization of the reproduction processes. The core of this task is the use of skilled labor, i.e., the ability to make material and energy highly efficient and produce quality commodities.

All elements in this unified economic strategy have to make labor decisively more efficient, expressed above all in a considerable reduction of the production consumption, in a better qualitative composition of the national income in terms of intrinsic value and in increasing growth rates. The alpha and omega is that production must rise faster than the investment in embodied and live labor. Only then is the criterion of intensively expanded reproduction met fully. Greater labor efficiency reflecting a higher labor productivity and the effect of enhanced refinement is the critical source for further economic growth and thus of considerable consequence to the implementation of the main task policy.

No doubt, labor efficiency largely depends on comprehensive socialist rationalization. It contains a broad spectrum of possibilities which must all be used. The centerpiece however are the main trends that come along with scientific-technical progress, e.g., more automation, technologies and procedures altogether, special importance attaching to a broad use of microelectronics, automated controls and the use of industrial robots.

An implementation of all these sides of the economic strategy calls for an investment policy fully focused on intensification, in fact it determines the criteria for it. The emphasis here lies on making the main features of scientific-technical progress prevail, above all in the sense of advanced equipment and its appropriate technologies, whereby to contribute to optimum economic efficacy and to favorable effects altogether on behalf of society. This presupposes a decisive change in investment structure in favor of the investments going for equipment, and it also demands that a higher intensification contribution is made within the scope of simple reproduction, through the renewal, modernization and reconstruction of available basic assets, based on new technologies. The acid test for fulfilling all these tasks lies in the needed reduction of time frames for implementing investments and their rapid economic effectiveness.

While the implementation of the requirements referred to up to this point in the economic strategy serves the implementation of the main task all-around, it is no less important, and quite directly so, to the task to produce far more and better public supply consumer goods. Mainly from domestic raw materials, through more of a use of scientific-technical data, must we produce high-grade consumer goods that satisfy demands, also in terms of their designs. This demand also fully addresses the means of production industry. Complying with it will, as much as the implementation of all other tasks stemming from our economic strategy, help ensure our needed economic growth, which is mainly reflected in our planned higher national income.

In summary, this we can see: the economically fundamental way to shape further the developed socialist society and the material-technical base that conforms to it is the resolute implementation of our intensively expanded reproduction in each combine and enterprise, and in our entire economy. That way alone will we get the performance improvement we need. The perfecting of our management and planning and of motivating high achievements, every step in the shaping of our productive forces and all processes in the economic field must be channeled into this main road toward economic growth.

More of a Use of Our Intellectual-Creative Potential

Of critical importance for improved performance in years to come are the greater opportunities our society has and the increased capacity to use our country's entire intellectual potential; not only the scientific-technical potential in the more narrow sense but all working people's intellectual capabilities. For an ever more effective use of this advantage of our society the creative cooperation of the innovators of the working class with intellectuals, effective forms of mass initiative and socialist competition are gaining still greater weight. Simultaneously, especially in view of the growing future requirements, the scientists have a responsibility that is greater than ever increasingly to shape, through their creative contributions and research results of high rank, the progress-promoting and humanistic character of science in our country, as it conforms with the expectations of our society in accordance with our party program objectives. Science has been challenged to achieve greater results still toward economic growth and improving the working people's material and cultural standard of living. In this sense it is imperative to concentrate our country's science potential still more strongly on focal points that correspond to current and future economic requirements and social and scientific necessities.

Top achievements are mainly needed that improve the technical and technological production levels in every way, facilitate a still more rational use of energy and raw material resources, and significantly improve our labor capacity by means of socialist rationalization and the automation of production processes. That presupposes working in good time on new propitious science fields through their own potential and within the scope of international socialist economic cooperation and preparing the use of results therefrom. All the more important it is then that the scientists and collectives in all research institutions improve the efficiency of scientific work and do what they can to have noteworthy research results to show for. New lines of development in particular call for perspicacity, commitment and determination. Especially those research collectives and, above all, science managers meet their social responsibility who apply to the quality of their efforts the only criterion that is acceptable to us: the most advanced status in any given science field. The scientists' own efforts in familiarizing themselves with international top standards, promoting and challenging young gifted scientists, and perfecting, and using intensively, the material-technical research conditions cannot be great enough. A personal will to perform, increasingly shaped by high socialist awareness, creative cooperation between representatives of the workers class and the scientific-technical intelligentsia, skilled management activity and--as an indispensable prerequisite--the management of these processes by our Marxist-Leninist party critically decide how fully the favorable objective preconditions socialism offers to scientific-technical creativity are translated into demanding results.

There have been greater opportunities in recent years to effect economic growth through scientific-technical progress, and they will continue to grow because the processes in our scientific-technical revolution have received mighty impulses recently and increasingly control the overall process of scientific-technical progress. The extent to which these opportunities are realized will essentially depend on fruitful ideas given birth in the decisive directions of economic progress and translated--starting with basic research--more expediently into technical

solutions for new products and procedures and rapidly transfered into production and widely used. Success will be all the greater here, the better we succeed in making a concentrated use of funds and capacities, so that we will at one and the same time work on fewer problems that take less time and organize the production of new commodities rapidly and with a high economic impact.

More of a use of the available intellectual-creative potential is of critical importance for the performance improvement needed in the 1980's. In the thirst for education and its practical application, social and personal interests fuse to a high degree and determine the effectiveness of human activity in all social domains. It is absurd, therefore, to talk about an excess of education in our country, as some people do. Social development cannot be organized in its proper structure nor can it be put to the best use without educational lead time. There is no other way for us to face the requirements of tomorrow, not, in principle, with respect to the humanistic and dynamic character of our society, and not for tapping the resources for economic growth and surmounting certain contradictions.

The educational lead time produced imposes of course, above all, on the state managers on the central level as on those in the combines and enterprises an obligation that is all the greater to seek ways and means for its maximum use and not to let it be scattered to the winds, become inconsequential, as it were. Practice has demonstrated that the intellectual-creative potential that has been produced can certainly be used still more effectively by employing personnel in line with their skills--from the technicians to the university graduates. In particular, greater efforts have to be made to improve the conformity between the training levels and the skill requirements, between vocational training and the technical skills actually demanded. The more intensively knowledge and skills acquired are called upon by the activity in which an individual is engaged, the more favorably that will affect the willingness for top performance, the more fun there is in work, the more of an impulses is there for creative efforts, and the more positive it also is for the social climate in the enterprise and the work collective.

Major Trends in Science Development

The 10th SED Congress affirmed that now the possibilities of the scientific-technical revolution have become directly the major reserve for higher performance and greater economic efficiency. Making use of these possibilities requires a sober and sufficiently detailed assessment of the major trends of the scientific-technical revolution in the world. A priority is warranted in our conclusions for trends of strategic character, such as microelectronics, objective development processes that are transforming the productive forces on long range, revolutionizing them through their broad implications. They control the marketability of the products in terms of intrinsic value and price, the level of the modern productive forces, the effectiveness of reproduction in socialism and thus the possibilities for satisfying public demands and those in all domains of socialist society over the long run.

To implement with success the fundamental goals of our party's social policy, and especially its economic strategy for the 1980's, the GDR's R&D potential is concentrated on the following major trends:

"-rational use and supply of energy on the basis of domestic soft coal, a far-reaching utilization of secondary energy reserves and an increasing use of nuclear energy, with the highest effectiveness of coal mining equipment and energy conversion installations;
--most effective use and maximum refinement of available raw materials and maximum reuse of secondary raw materials and waste-products;
--accelerated development and application of microelectronics as a key technology at the whole economic range for improving productivity through the automation of labor and information processes and the reduction of raw material and material consumption;
--development and effective use of highly refined chemical and metallurgical raw materials and silicate raw materials, and the introduction of material-conserving technologies and designs for improving the cost/benefit ratio;
--increased productivity and enhanced qualitative levels for economically important machines, equipment and installations for rationalization and export that brings in much foreign exchange, on the basis of labor and processing technologies that save working hours, energy and material, through a comprehensive application of industrial robots and efficient measurement and testing devices;
--development of high-grade consumer goods at favorable costs and in excellent quality and good design, responsive to public demands and for lucrative export, including the requisite, standard-controlling components and preliminary products;
--health care, promotion and rehabilitation through effective medical research contributions to health care and diagnosing illnesses, and making available the needed highly-effective medicines and an efficient medical technology;
--a higher qualitative level and a reduction of expenses in housing and industrial construction by introducing effective solutions, especially in the modernization of old housing and the reconstruction of industrial structures, and new products for finishing and furnishing residential buildings; and
--supplying the public with foodstuffs and production with raw materials from our own domestic agricultural and foodstuffs industry through increasing the capacity of crop and animal production on the basis of advanced data from the biological sciences, including genetic engineering."[3]

By establishing those trends we intend to take account in our economy of the accelerated structural changes in the international division of labor in the 1980's. An extra margin is left for creativity within the scope of these trends, because in the interest of highest results and highest efficiency in the broadest sense, alternatives for the revolutionary procedures, products and technologies are definitely also wanted. Top achievements are challenged here which would document the superiority of the socialist social system.

To keep in step with the worldwide acceleration of scientific-technical progress, we must actively take account of that objective process in our economic strategy. Greater efforts still should therefore be aimed at reducing the time it takes to make basic innovations applicable, popularize them and put the products on the market. An analysis of the time frame from the occurrence of a fundamentally novel idea to its application in practive in the world established that the trend for shortening the cycle can be clearly seen and documented especially in those branches that are essential for the scientific-technical revolution like electronics, the chemical industry, the optical and photochemical industry, machine building and polygraphy, that is to say, it is prominent precisely in important and most research-intensive "growth industries" in this century. But also other branches experience a reduction of their cycles because of the competition for replacements at an international scale.

Thus our combines, if they want to make a lot of money on the world market with their basic inventions, must generally seek the shortest cycle and enforce the needed qualitative modifications in reproduction purposefully. That includes fulfilling still another internationally valid trend that goes hand in hand with the shortening of the cycle: the greater speed in distribution. For the combines that means to reach a high production volume fast for important innovations. The trend of shorter cycles and the higher distribution speed greatly brought it about that the marketing period for many new products has been shortened much in recent time--within the last decade circa by one-half. For small and microcomputers the span of a generation has now been reduced to between 3 and 5 years. Whereas classic office machinery would keep its basic design between 10 and 15 years and was exported with high economic benefits, the introduction of microelectronics produced a decidedly briefer working-life cycle for bookkeeping machines. Today they are already working on replacement equipment for devices that only now have properly come into production. This trend can be found in all fields, mainly in those that are research-intensive. The reduced production and marketing periods in general impose briefer warm-up periods for series production (maximum production units must now be obtained in the first or second year already) and a critical reduction of the development and application periods, while the R&D results at the same time have to be of superior quality. Particularly by forming the combines essential premises were established for better meeting the new demands of the time factor through a new quality of scientific-technical work and modern research organization.

Basic research is increasingly and perceptibly gaining in weight. It is the source of the revolutionizing modifications in the development of the productive forces. The history of the productive forces in general, and in the GDR in particular, knows of many examples that show how from basic research in combination with applied research new products and technologies evolved and existing industrial branches went through essential structural modifications and new ones were born. Let us adduce but one highly pertinent example: the boom of microelectronics in the GDR would certainly not be possible in its increasing and planned scope and speed without the basic research in pure substances, solid-state physics and raw material research. Our party resolutions therefore provide for basic research to receive the research lead time needed for our economic development within the framework of the natural and technical sciences research programs.

Intensive Science and Production Cooperation Within CEMA

As an internationalist social order socialism provides for the modern productive forces a commensurate field of action that exceeds any national framework and guarantees for all working people that they will benefit from the fruits of their labor. To make an ever better use of these opportunities is an objective requirement because, after all, the resources used in the various socialist countries, their intellectual potentials, and all their efforts in many fields, can find their highest effectiveness only through international coordination and concentration. In particular it is found in the process of the scientific-technical revolution that coping with it implies our international socialist division of labor in R&D and production--as has become the case more and more effectively within the CEMA framework--, by which it is intensified and its effects are raised to a higher power.

For our republic the R&D and production cooperation with the USSR and the other CEMA countries is and remains a decisive element of our economic strategy, and particularly of our scientific-technical policy. That is demonstrated by the increase agreed upon in reciprocal deliveries for the 1981-1985 period as much as by the still more rapid exchange of specialized and cooperation products. The GDR-USSR specialization and cooperation program till 1990 aims at lifting the interlinking of our economies onto a completely new plain. Funded through 35 major trends in specialization and cooperation, it aims at achieving or expanding scientific-technical top positions at a large breadth and creating favorable conditions for effective production concentration. Further extended will be lines in the division of labor that are essential to the dynamics of trade, and new propitious fields will be included in our specialization and cooperation. Especially promising are our joint efforts in developing and broadly applying microelectronics. The GDR is among the countries that develop and produce microelectronics themselves--in close cooperation with the USSR. In this field mutual deliveries are already strongly marked by the results of our research and production cooperation. While, for example, the VEB Carl Zeiss Jena Combine develops and produces important sets of equipment for microlithography, the USSR in turn rapidly increases the supplies of construction elements and components. Cultivating and further extending such cooperation is one of the guarantees for that the community of socialist states can not only keep pace with the development of science and technology but can even set standards for that development in critical areas. It remains for that to be ensured absolutely and still more definitely in the future.

Scientific-Technical Revolution and Ideological Class Struggle

Not only through their real manifestations and processes are science and technology a main field in the class conflict with imperialism, but also with respect to their intellectual reverberations. Bourgeois ideology has become increasingly more pessimistic in rating scientific-technical progress, chiefly in connection with the development of data-processing techniques, particularly of microelectronics. Theories are presented there which in the final analysis "demonize" technology. The real background of such attempts is the fact that the scientific-technical revolution has not, as bourgeois ideologues still announced with euphoria in the early 1970's, revived economic growth, guaranteed full employment, and led all around to a social stabilization of the capitalist order. Today, "the discussion of zero growth" has moved "from the flirting stage to that of imposed reality."[4]

Lots is involved in the explanations the bourgeois ideology offers for its economic crisis phenomena--for instance, supposed limits set to growth by nature, unreasonable modes of human behavior, egoism or myopia, and finally also purportedly negative effects of scientific-technical progress as such. But one cause--which happens to be the only correct one--is never mentioned: the inability of the capitalist order to transform economic progress, without any restraint by social barriers, into social progress, the anti-humanistic nature of the capitalist order.

Coping with the questions resulting for the life in our society from the scientific-technical revolution, the real results in the shaping of interrelations among scientific-technical, economic and social progress and the growing opportunities for making these ties still closer demonstrate: the supreme premise for the development

of science and technology in our country is the well-being of our citizens, their existence in human dignity, in safety and peace. The social principles of our system and its power and property relations leave no room for abusive or inhuman developments of science and technology. The profound humanism of our society can be glimpsed, for example, precisely from how in our republic, which is making every effort to preserve its frontal position among the world's industrial states, the exceedingly stubborn and tenacious struggle for top achievements and high economic efficiency always goes together with making the life of the people more substantial, interesting and creative, and their living conditions easier, more beautiful and more dignified in human terms, and from how the solution of global issues of mankind is never removed from our responsibility on account of the urgency of our own affairs.

Our society has urgent issues that come from the development of science and technology or because of it insist on being resolved. One issue is how our educational system, as all other public domains, could still better help develop to a maximum the capacities of men who are and remain the creators of science and technology. Another issue is how we could produce an optimum harmony between socialist personality development and the demands of an accelerated scientific-technical progress. And then there is the question how the greater technological possibilities for making work more diversified and responsible could be realized in practice. Yet the working people in our country do not fear scientific-technical progress. They do not think it threatens their livelihood. We do not ignore that scientific-technical progress today often brings deep changes to the way people work and live. Nor do we overlook that with the further advance of science and technology big problems will have to be faced in the future, and many effects that cannot yet be seen today might still be asking a great deal of efforts from the scientists. That, however, does not diminish our confidence that we shall steer the scientific-technical revolution through managerial awareness in such a way that it will help shape ever more deeply the humanistic countenance of socialist society.

FOOTNOTES

1. Cf. Comrade Erich Honecker, "Bericht des Zentralkomitees der Sozialistischen Einheitspartei Deutschlands an den X. Parteitag der SED," Dietz publishing house, Berlin, 1981, pp 49 ff.

2. Cf. Guenter Mittag, "Combines in the Struggle for Implementing the Economic Strategy of the 10th Party Congress," EINHEIT, No 6, 1981, pp 531 ff.

3. "Direktive des X. Parteitages der SED zum Fuenfjahrplan fuer die Entwicklung der Volkswirtschaft der DDR in den Jahren 1981 bis 1985," Dietz publishing house, Berlin, 1981, pp 20-21.

4. SUEDDEUTSCHE ZEITUNG, Munich, 31 December 1980, p 4.

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INTERDISCIPLINARY COOPERATION URGED FOR S&T RESEARCH

East Berlin EINHEIT in German Vol 36 No 8, Aug 81 (signed to press 9 Jul 81) pp 770-776

['Science in Our Society' feature article by Prof Dr Ulrich Hofmann, engineer, vice president, GDR Academy of Sciences; and Prof Dr Wolfgang Marschall, engineer, economist, department head, Central Institute for Economic Sciences, GDR Academy of Sciences: "Interdisciplinary Research Must Be Intensified." A translation of the article by Hannes Hoernig and Gregor Schirmer cited in footnote 5 is published under the heading, "Commentary on Social Science Research Plan," in JPRS 77514, 5 Mar 81, EAST EUROPE REPORT: POLITICAL, SOCIOLOGICAL AND MILITARY AFFAIRS No 1854, pp 55-64. The same JPRS issue contains also a translation of the official text of this 'Central Research Plan of the GDR's Marxist-Leninist Social Sciences, 1981-85' on pp 23-54]

[Text] Through more effective cooperation among the natural, social and technical sciences, the science contribution to the development of the developed socialist society must be intensified. What explains the need for more intensive interdisciplinary cooperation? What are the experiences of the Academy of Sciences, and what fosters and what blocks the development of interdisciplinary cooperation? What demands arise with respect to its management and planning?

The 10th SED Congress directive emphatically asserts that the science contribution must be further intensified through an effective cooperation among the natural, social and technical sciences "so as to always better control the more intensive interactions between scientific-technical, economic and social progress, the upward development of the productive forces, the perfection of the socialist production relations and the social superstructure."[1]

The tempo and degree of complication of scientific-technical progress, the expectations attached to its use in our socialist society and, moreover, serious global problems bring up many questions making unprecedented demands on science and technology in our country. This is a magnificent challenge to scientific creativity and shows the magnitude of the scientists' social responsibility. One only has to look at some of the complex issues that have to be taken care of for finding solutions on behalf men's well-being in socialism. In terms of our party program,

formulated with a view to our country's future, in accordance with the economic strategy for the 1980's, it involves the science contribution to ensuring our energy base, especially by a rational energy use and the gradual availability of nuclear energy, to ensuring our raw and working material base through an economical use and the refinement of raw and working materials, or to our reproducing our environment. Socioeconomic effects and other social consequences of our scientific-technical progress are of great weight within the solutions to be found in our society where science and technology are never developed for their own sake but always for the benefit of the people.

Science and technology are facing great tasks to be able to shape these processes consciously and systematically from the outset. Only consider--to use only one already relevant process today as an example--automation which, among other things, does away with heavy physical work yet may also create in its first phase psychologically stressful activities, e.g., mentally fatiguing routine work. Thus it is all the more important to shape scientific-technical progress from the outset in accordance with a unified social concept so that its positive implications for man and his environment can be made as big as possible and any negative implications are eliminated by appropriate social or technical measures. Among the decisive advantages of the socialist system is that it can do so without any constraints imposed by the system in that it can direct its considerable intellectual and material-technical potentials, through a division-of-labor cooperation, at the very problems that provide the greatest social benefits and highest efficiency increases.

Finding and carrying out these solutions is the high responsibility the scientists bear. Indeed, it becomes increasingly urgent for them to take an active part in preparing strategic decisions for the continuing development of socialist society, in conformity with the basic research concept adopted. More complex interdisciplinary projects also are becoming more compelling here because of the diverse interrelations between nature and society. "They make great demands on science management and organization and on each scientist's ability and readiness to absorb problems and results of other disciplines and add his own high achievements to the cooperative effort."[2]

Interdisciplinary Cooperation--A Social Requirement

Interdisciplinary cooperation developed under objective pressure both in economic and in science development. Embryonicly it has existed as long as there have been scientific and technical disciplines. But it did take quite a while for it to become fully recognized as an essential principle for scientific and technical work. Looked at historically, it was in industrial laboratories of capitalist corporations where interdisciplinary R&D was carried on purposefully, systematically, and at a large scope to pose and solve problems with their appropriate economic effects on products and procedures.

Looking at the development in our society, especially economic development, one finds mainly three factors that compel more cooperation among natural, technical and social sciences. First, the increasing complexity of economic, scientific-technical and social requirements, second, the increasing entwining among economic branches with each other and with other domains in society, and third, the intensification of socialist economic integration. Advances in these three processes are of critical

importance to the requisite boost in labor productivity and efficiency on behalf of further elevating the people's material and cultural standard of living and strengthening socialism in the broadest sense.

Great pressure for intensifying interdisciplinary research comes from science development itself, and this due to the process of science differentiation and integration. An ever increasing socialization of the research process is unmistakable. That is enforced by the high status of scientific knowledge, the grown material-technical base and, not last, the variety and complicated nature of the tasks. The objective foundation is the material unity of the world and its reflection in consciousness as the all-inclusive subject matter of all sciences.[3]

Any given discipline is concerned with understanding specific domains of objective reality. Understanding that in its totality is consequently also the business of all science disciplines. Within the scope of the ongoing differentiation and integration, a trend of ever increasing weight attaches to the cooperation of diverse disciplines both for the cognitive process itself and for making use of this cognition. It is found that at the very interstices between various disciplines cognitions are gained that are of weight to the advance of science.

An example of the more recent past is the discovery of the DNA double helix made jointly by biologists, physicists and chemists.* On its basis it became possible to gain deeper insights into propagation and heredity processes. Genetic engineering pursues that direction, a novel technology derived from molecular biology, by means of which, e.g., micro-organisms, through interference with the genetic structure, can be made to produce human insulin.

There are various aspects to the process of science integration. It may be described in its increasing importance to "bonded sciences," such as physical chemistry, biochemistry or biophysics, through generating "synthesizing" sciences like cybernetics or the science of science, and finally in terms of the development of "problem sciences" such as oncology.[4] At present it is mainly marked by the urgent need for cooperative research between natural and social scientists and technicians. Interdisciplinary cooperation in its essence is a basic requirement for scientific and technical work that comprehends all phases of the work process--all the way from recognizing a problem situation to the utilization of the work results in social practice. And it is not only a methods question because deriving interdisciplinary research projects itself is an extremely tough task that may succeed or fail.

Our experiences have taught us that interdisciplinary work must be based on a solid foundation of disciplinary knowledge and always be combined with concrete targets in the various disciplines. Furthermore, the basic knowledge in any given partner discipline plays a role that is not to be underestimated. The main thing is, however, to determine joint objectives correctly, develop joint methods and find a common language to arrive at both theoretically ensured and practical results. And more even that that: interdisciplinary work presupposes an ability and will for cooperation, appropriate ideological attitudes, in other words, that have to be created.

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*The deoxyribonucleic acid molecule stores genetic information and has a double-spiral structure.

Typical of the current phase of the scientific-technical revolution is the closer bind between natural science and modern technology. Outstanding examples of it are nuclear technology, microelectronics, laser technology, electronic computer technology and modern biotechnology--all areas that only originated in the course of the last 40 years. It is no accident that the laboratory and production technologies in these areas are so very much alike.

The forms of interdisciplinary coooperation may be most diversified, as the tasks to be solved may also be. They range from taking account of the results in other science disciplines by individual researchers to the division-of-labor cooperation among several scientists all the way to the forming of problem groups or problem commissions made up of scientists of diverse specializations.

An essential aspect of interdisciplinary cooperation, its traditional form, as it were, lies in reciprocal scientific and methodological interpenetration, the use of science data, methods, experiences as well as of the prevailing views and approaches of one discipline in other disciplines. For example, the broadest use of of mathematical and computer technology methods is hardly controversial in any science disciplines. Very impressive is the close tie between mathematics and theoretical physics. Measurement methods of physics are used universally. Great advances came from mathematical, physical and chemical modes of thinking and methods entering the biosciences, especially molecular biology. So it is not astonishing that in molecular biological institutes, e.g., in addition to biologists, many mathematicians, chemists and physicists are working on equal terms.

We have become eyewitnesses of a massive employment of physical testing methods, computer technology methods and other principles of numerous fields in medical research and the health field. A typical example of it is the computer tomograph, an efficient computer-aided X-ray device by which information can be obtained and stored of any body sections and organic and other contours can be made visible.

These developments in interdisciplinary cooperation mark a new stage: the formation of a whole number of efficient scientific methods relatively independent being now systematically used at an unprecedented range and speed.

New kinds of demands for interdisciplinary cooperation arise also from the fact that the solution of complicated economic, scientific and other problems by their very nature more and more call for the work and cooperation of several disciplines. Only consider the exploration, development and production of working materials, especially those with specific physical, chemical or biological properties. Or this: to exploring cell membranes in organic matter the knowledge of physical and chemical principles is of importance. Such research data are admitted, e.g., to solid-state research, materials development and catalytic research.

Interdisciplinary work, like any work, is concrete. Looking for a simple general implementation pattern for it would not be appropriate. There are indeed great differences between mathematicians, physicists and chemists who in polymeric chemistry look for a new substance conversion procedure, e.g. to make acetyl, and nuclear physicists, energy experts and economists who work on models for an optimum use of energy sources like coal, petroleum, natural gas and nuclear energy, or technicians, designers, sociologists and psychologists conferring on the socioeconomic aspects in the introduction of new automation techniques such as robot technology.

Experiences in the Academy of Sciences

How interdisciplinary cooperation among natural, technical and social sciences is concretely implemented can be shown with reference to research on basic problems of microelectronics. The Academy of Sciences has already had good experiences and success with it, even if many an obstacle had to be surmounted. There were some institutes, after all, which initially thought only physics institutes had any use for microelectronics. At the Academy of Sciences there are circa 1,000 associates who are creating the scientific lead time for microelectronics, are engaged in applied research and normally, through transition collectives and jointly with industry, take care of the transfer of their research data into material production. For instance, in the mathematics institute research is done on a computer-aided spot design. Various physics institutes handle the research on crystallization and crystal processing, microstructuring, ionic implantation of components and various working material matters. Chemical institutes are devoted to questions in the production of pure substances and pure-substance analysis. Some institutes deal with component technologies, others with circuit theory, and with the development and construction of science equipment based on most up-to-date microelectronic components, which include microprocessors. Not last, social science institutions also have an active part in all this research. There is for instance the central institute for economic sciences which, among other things, has prepared, through cooperation with institutes of natural and technical sciences, a study on the economic and social effects and other ramifications by the broad application of microelectronics in the GDR national economy.

To coordinate this complex research task, the president appointed someone in charge of microelectronics in the Academy of Sciences. His responsibility is the preparation, implementation and control of the complex "microelectronics" research task, which is an element of the overall basic research five-year plan at the Academy of Sciences and of the ministerial domain for university and technical school affairs and of the plans of the Academy of Sciences and its institutes. For coordinating the partial tasks, which usually concern several institutes, state managers are responsible who command the main potential in each case.

An important step, mainly under the aspect of the cooperation among combines, universities, colleges and institutes of the Academy, was the founding of a scientific council of the Academy of Sciences of the GDR for the principles of microelectronics. This body offers a broad field for exchange of ideas and scientific debate. Also in the science councils of the research programs like physics and chemistry and in the courses given by the Academy of Sciences, microelectronics is a subject of debate. All that has much helped the mutual understanding and has been very fruitful for the projects.

Management and Planning Requirements

The requirements for interdisciplinary cooperation, along with the disciplinary aspect, which remains primary, wil have to be more prominently taken into account when science research institutions are formed and structured in the future.

In basic research, chiefly with regard to the gain in fundamental science knowledge needed, the question is properly raised what the critical scientific breakthroughs are and under which preconditions and premises they can succeed. No doubt the knot will be cut most rapidly where the best conditions prevail. But what establishes them? Does a breakthrough become successful in, let us say, one research collective with 200 associates or in ten research collectives with 20 associates each? The fact is that excess concentration of personnel may produce anonymity and dampen the contest. When we are talking about ten different collectives here it means an embedding in various science patterns, disciplines, schools, traditional methods, technical opportunities and, not last, in various intellectual attitudes and modes of thinking. It is peculiar of basic research that the second alternative is likely to get the thing done faster. But in applied research the reverse would rather seem to be true.

Itis of extraordinary importance that institutes work together at once and directly which represent different disciplines needed to solve a task. Such inter-institutional cooperation came about, e.g., in the development and introduction of a laser scalpel, between the central institute for optics and spectroscopy of the Academy of Sciences and the Charite hospital of Humboldt University.

Global problems in humanity development like the energy and the raw material problem must be handled by social science institutes as well as natural science institutes in a basic and long-term manner in conformity with a common conception within the framework of their always specific, discipline-oriented sets of topics. For solving specific, particularly topical, requirements, efficient temporary working teams should be set up going beyond the confines of any one institute. Equally important is held to be our expanding or setting up economic, sociological and other departments or working teams in natural science and technical institutes which are responsible for, or coordinate, larger, economically highly relevant scientific-technical fields. There are institutes in the Academy that have had good experiences in this regard, for instance the research institute for the preparation and processing of raw materials for industry, the institute for chemical technology and the central institute for nutrition.

As a result of scientific-technical progress, institutes were set up and are being set up with the objective of conforming with interdisciplinary requirements to a large extent without becoming dependent on all too much cooperation which, after all, causes additional expenditures. In the Academy of Sciences that applies, e.g., to the central institute for nutrition and the central nuclear research institute.

The science councils function as important instruments for promoting and directing interdisciplinary work, mainly for research programs and large scientific-technical projects and the classes ard the plenum of the Academy. The spectrum of their activities ranges from prognostic work to spotting developmental trends to initiating research trends, the discussion of topical problems all the way to pronouncing scientific judgment on what has been achieved. Their great advantage is that they are composed irrespective of institutional and departmental constraints and embrace many--in the case of the Academy plenum--and even, as it were, all disciplines and fields. This is an advantage of which we must constantly make better use.

Interdisciplinary cooperation can and must of course be planned like any other research task. And the tasks posed must show the compelling need for interdisciplinary cooperation.

Interdisciplinary work in the natural, technical and social sciences is becoming especially important where it is a matter of taking care of complex social problems. Thus the Central Research Plan of the GDR's Marxist-Leninist Social Sciences, 1981-85, provides for working on such interdisciplinary research complexes as "scientific-technical revolution, social progress and intellectual debate," or "natural science, technical, economic and social prerequisites and conditions for tapping and using energy sources and other raw materials." In elaborating and establishing the social foundations for healthy nutrition are involved, for instance, the central economics institute, the institute for the theory, history and organization of science, and the central institute for nutrition. "That at once raises questions concerning social science management because it is, after all, a matter of finding and encouraging the suitable forms of organization and communication for the scientists, arriving at clear management decisions which will help overcome institutional departmentalization, are governed by an overview over the whole thing and ensure the needed research capacities to be put together."[5]

In the 5-year plan draft for natural science and mathematics basic research and for basic research in selected technical fields for from 1981 to 1985, complex research tasks likewise are assigned, which include, among others, processing materials, microbic protein synthesis and geological principles for using the earth's outer crust.

The further development and effectiveness of interdisciplinary work depends on surmounting both objective difficulties and subjective reservations. There are disciplines that have had so much of an independent development that they find it complicated to reach agreement on a subject matter to be handled by interdisciplinary efforts. But that problem can also be solved if--as our experiences demonstrate--intensive and regular discussions are conducted on the common research projects. Some expect too little and some too much of interdisciplinary cooperation. Discounting discussions, which cost nothing, and all the exchange of ideas and experiences, interdisciplinary work does often call for greater expense. That, however, is justified when the matter calls for it and the extra expense brings an appropriately large extra benefit. Sometimes the debates about expenses hide a lack of performance readiness, an inability to understand important overall connections and possibly even inept research capabilities. That makes it all the more important to achieve more political and technical maturity in the research collectives through the ideological work of the party organizations in order to break through any possible barriers. Social requirements must be presented cogently and in good time, and more of an effect must be derived from fine examples.

Tasks are assigned that require much better and more comprehensive interdisciplinary efforts than we have made, by the science and technology state plan, which with its government orders serves to introduce comprehensive economic innovative processes, the central Marxist-Leninist social science research plan, the natural sciences and mathematics basic research plan, the technical trends chosen for basic research at the Academy of Sciences and in the area of the ministry for university and technical school affairs. Taking care of them is a high requirement our society places on the scientists in all institutions.

FOOTNOTES

1. "Direktive des X. Parteitages der SED zum Fuenfjahrplan fuer die Entwicklung der Volkswirtschaft der DDR in den Jahren 1981 bis 1985," Dietz publishing house, Berlin, 1981, p 22.

2. Comrade Erich Honecker, "Bericht des Zentralkomitees der Sozialistischen Einheitspartei Deutschlands an den X. Parteitag der SED," Dietz publishing house, 1981, p 92.

3. Cf. Kurt Hager, "Wissenschaft und Technologie im Sozialismus" (Science and Technology in Socialism), Dietz publishing house, Berlin, 1974, p 31.

4. Cf. G. N. Wolkow, "Soziologie der Wissenschaft" (The Sociology of Science), Dietz publishing house, Berlin, 1970, pp 286-287.

5. Hannes Hoernig and Gregor Schirmer, "High Qualitative and Efficiency Demands for the Marxist-Leninist Social Sciences," EINHEIT, No 12, 1980, p 1240.

5885
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POLISH ECONOMIC SITUATION, REFORM OUTLINED

Budapest MAGYARORSZAG in Hungarian 27 Sep 81 pp 8-9

[Article by Endre Gomori: "Reality's Challenge"]

[Text] The political and social clashes of the fluctuating crisis in Poland often divert public attention from the exceptional efforts that the country's leadership is exerting to extricate the country from the economic crisis. These efforts are embodied in a program of economic reform, prepared by the Economic Reform Committee that the government set up already in the autumn of 1980. The committee's work was of course hampered by the fact that the project had been long overdue.

Causes of Crisis

As the Economic Reform Committee itself points out, two previous attempts were made to reform the economy.

After August 1956 (under Gomulka), a debate was held on an economic model. Significant changes were made at that time in the system of managing the economy. Enterprise independence was increased, the institution of workers' councils was established, changes were initiated in agricultural policy, and central management of the economy was curtailed. However, the decided changes were not implemented consistently and even began to be rescinded gradually; Poland reverted to the old practice, although in modified form.

After December 1970, following the first great outburst of mass dissatisfaction (the start of the Gierek period), Poland again began to modernize its system of economic management. But this attempt, too, faltered and eventually led to a practice of unsound economic policy.

Scores of Poland's best economists were included in the work of the Economic Reform Committee, in the search for a way out. The first task of the documents prepared by the Economic Reform Committee was to survey the situation and analyze the causes of the crisis. The committee's judgment in this respect was completely unambiguous. In its draft entitled "The Directions of Polish Economic Reform," published as a supplement to TRYBUNA LUDU, the committee establishes that the underlying economic causes of the crisis are the

many mistakes and even breakdown of the previous system of management and planning (the document calls it "the command-directed system"). In Poland "the consequences of the unprecedented socioeconomic crisis cannot be overcome within the framework of the command-directed system." This same document defines also the social impact of the mentioned economic system: "The autocratic system of exercising power and the unsound voluntaristic socioeconomic policy led to dangerous national economic stresses and disproportions. This was one of the important causes of the national economy's low efficiency, and in the final outcome this is what evoked the social conflict."

'The Strategy of Leap'

What was this like in practice? The starting point was the so-called "new strategy of economic development" that was unveiled in the early 1970s. Its objective was essentially the execution of an exceptionally ambitious "leap" in investment and technology, including a spectacular development of extractive industry. The foreign loans necessary for the implementation of this strategy were to be serviced with the products of extractive industry. The "strategy of leap" necessarily took into account the large-scale importation of basic materials, raw materials and semifinished products for the exporting industries, and it anticipated in advance large-scale imports of grain and feed as a result of agriculture's stagnation, due to the fact that agriculture would not enjoy any preference in development and investment activity.

Typical of the exceptionally ambitious nature of the "leap" was that outlays for investment in 1972-1975 rose by more than 25 percent each year. In 1975 the rate of accumulation already exceeded 41 percent, one of the highest such rates in the world. This was accompanied by an enormous growth of imports, which would not have been feasible without resorting to foreign credits. This is when Poland's large-scale foreign indebtedness began.

It should be noted that in the "take-off" phase of this policy--essentially until 1974, while international market conditions remained relatively stable, before the oil and raw-material price shocks--the rapid growth attained with the use of large-scale credits (the average annual growth rate of national income in 1971-1975 was nearly 10 percent) produced also a growth of real wages, on the same scale.

In an economic sense, however, this growth of real wages was already fictitious, unsubstantiated growth. Actually an ever-larges share, practically half, of the huge international credits was no longer invested. These credits were gradually transformed into consumption credits. Thus the growth of real wages was covered increasingly from these credits, and this "structure" had to collapse already on the basis of its own internal laws.

Rapid deterioration of the international economic conditions accelerated and intensified this process. A more of less open crisis can be said to exist since 1978, when real wages declined by nearly 3 percent. For the fist time in postwar Polish history, national income dropped in 1979 (by 2.3 percent).

Suppression of agriculture was an integral part of this economic policy. For specific social and historical reasons, 75 percent of the acreage under cultivation in Poland is privately owned. Labor productivity is unquestionably higher on the state farms and in the cooperative sector. However, the so-called net output per hectare gives a more realistic picture of the actual situation. It reflects the actual value of output per hectare, regardless of how much labor was used in production. Even in the 1960s, this net output per hectare was about twice higher on private farms than in the socialist sector of Poland's agriculture. Statistics show that from 1970 on this ratio shifted even more in the private sector's favor.

Amidst the enormous "leap" in investment, however, only about 4 percent of Polish industry produced to supply the needs of agriculture (manufactured fertilizers, farm machinery, etc.). All this combined with ill-considered and subsequently rescinded measures of economic policy that made questionable the guarantying of the small private farms' economic stability. As a result, Poland's grain output has not increased already since 1974, and since 1975 the supply of the domestic market has deteriorated rapidly. In the final outcome, specifically this was one of the immediate causes of the eruption of the crisis.

In a study that has been published also in Hungarian, the Polish economist Molendowski (staff member of the Institute of International Socioeconomic Relations, in Krakow) concludes that these phenomena "have long been the subject of society's sharp criticism. This criticism was nevertheless disregarded. Only the protest of the working masses led to the commencement of the processes of change."

The Past Year

The sociopolitical struggle that attained its full scale during the past year--i.e., since August 1980--made the dimensions of the crisis even more tragic, although it was a consequence rather than a cause of this crisis. Analyzing the situation, even the ultraconservative NEUE ZURCHER ZEITUNG of Switzerland states: "The political changes that occurred during the year have worsened rather than improved the economic situation . . .. They encouraged strikes and demonstrations as a response to dissatisfaction. Production thereby declined further, specifically at a time when stronger economic performances would have been needed to resolve the problems inherited from Gierek's ill-conceived investment policy and to reduce the mountain of debt."

National income during the past year is expected to be 15 percent lower, an internationally unprecedented drop. Industrial production is at present about 11 percent lower than a year ago. Within this the coal output, decisive in every respect, has dropped by more than 20 percent. Parallel with the declining output in industry, the payroll budget has increased by 24 percent; this naturally represents enormous inflationary pressure, particularly amidst shrinking supply and shortages.

A brighter spot in this gloomy picture of the past year is the situation in agriculture. Poland will foreseeably harvest 11 percent or 2.0 million tons more grain than what this year's plan calls for, although admittedly the plan was a stepped-down one; and the prospects of the potato and sugar-beet harvests have also improved considerably.

Grain production this year is expected to exceed 20 million tons. This is still 6.0 million tons less than two years ago. Considering the degree of the general crisis and the extent of the market's breakdown, however, it can be established that agriculture's resistance and regenerating capacity are relatively stronger. But by no means does this indicate that the demand (particularly the demand for meat) can be supplied in the foreseeable immediate future, or that large-scale agricultural import can be dispensed with.

Essentially this is the situation in which the government had to elaborate a plan for economic reform, based on solid socialist foundations.

Planning and the Enterprise

The principal direction of the reform has been determined by surveying the situation and identifying the causes of the crisis.

Accordingly, the reform clearly specifies that the system of institutions must be transformed significantly. The activities of public agencies must be made more open, and state management of the economy must be limited to the necessary extent. "The party performs policymaking, strategy-setting, inspiring and controlling functions in the economy. The party organs do not interfere in day-to-day management and systematically do not exercise the functions of state organs, self-management and enterprise management."

The reform rejects the view that the marketplace is the sole regulator of economic activity, but it also breaks with the situation where the central managing apparatus played the dominant role and the enterprises had no independence. "The national economy will function on the principle of central planning and will utilize the market mechanism." (To this the draft of the economic reform adds that market categories--profit, price, interest rate--will play an important role. Although these market categories were employed under the previous system, they were made subordinate to administrative directives, depriving them of their effectiveness. Now these market categories will serve as yarsticks for evaluating enterprise activity, and as real tools for decision-making.) In contrast with the planning model to date, it follows from this basic principle that "the central plan contains no immediate directives other than the tasks related to central investment, national defense, and especially important international contracts."

The basic economic unit under the reformed system is the enterprise functioning on the principles of independence, self-management and self-financing. The principle of enterprise independence has far-reaching consequences

for all areas of economic management, and thus it is no accident that the conflict of an economic nature between the government and Solidarity centers around this problem.

One focus of this conflict concerns ownership of the means of production. The government's draft starts out from the principle that the means of production--even when placed at the disposal of independently functioning enterprises--remain in the ownership of society as a whole. Solidarity's concept is that the enterprise is the exclusive owner of its assets, and all rights pertaining to the disposition of the assets rest with the enterprise collective. The government emphasizes that acceptance of this concept would mean the abandoning of ownership by society as a whole, in favor of group ownership.

Closely related to this conflict is another difference of views, on enterprise self-management. The plan elaborated by the government's Economic Reform Committee is based unambiguously on the principle of self-management. According to the legislative bill, the enterprise collective elects by secret ballot a general meeting for a one-year period, and--again by secret ballot, but for a two-year term of office--a council of the enterprise collective. The legislative bill ensures broad authority for this council. (Approval of the long-term and annual plans, approval of the balance sheet, authority to make investment decisions and conclude contracts, etc.)

In this respect the essence of the differences of opinion centers on the problem of appointing and dismissing the directors of state enterprises. The government's reform plan, respectively the legislative bill, states that the enterprise director is appointed and dismissed by a state organ. The self-management organ--i.e., the council of the enterprise collective--may decide within two weeks whether to concur with the appointment. At the same time the legislative bill states that, in certain specific cases, the charter establishing the enterprise may prescribe that the director be appointed and removed by the self-management council. State approval is necessary in such cases.

According to Solidarity's concept, the director would unambiguously be appointed and removed by the self-management council. Thus, generally speaking, the government proposal retains for the state the right to hire and fire, combining this with self-management's right to veto. In Solidarity's concept the roles are reversed.

The mentioned two conflicts jointly (i.e., the ownership of the means of production, and the hiring and firing of the director) are of such significance that the entire issue is raised to the sphere of political power. It is no accident that Solidarity speaks of enterprise autonomy, not of self-management.

And it is likewise no accident that Wozniak, economics secretary of the PZPR Central Committee and deputy chairman of the Economic Reform Committee, does not treat the appointment of the director simply as a personnel

decision. In a statement published in TRYBUNA LUDU, he formulated very clearly the relationship between government and the so-called nomenklatura list (a schedule of top posts, and of the qualifications required for them): "Maintenance of the party's nomenklatura list in the economy means that the PZPR will preserve its leading functions in the economy, and for the most part it will retain these functions within the state in general. Cadre policy, which the nomenklatura list serves to formulate, is an obvious and readily understandable vital attrbitue of the PZPR as the governing party. This must be stated clearly and directly, and it is superfluous to fabricate various artificial and intricate reasons for this. Thus the party will not renounce management of the economy, the formulation and implementation of social and economic policy, in such a way that the party assigns to important economic posts people whom it trusts the most. This question is not open to debate. However, there can be debate--and one has been going on for nearly a year--on the scope of the nomenklatura list's application in the economy." Wozniak added that: "the scope and mode of the nomenklatura list's application must be in harmony with the new legal foundations for the operation of enterprises and their self-management."

Primacy of Agriculture

Of fundamental importance is a further feature of the government's economic reform plan: establishment and assertion of the primacy of agriculture. According to the economic reform plan, the government's agricultural policy is based consistently on equal treatment of all sectors in agriculture. Accordingly, the plan guarantees the prospects of private farms and "recognizes them as a permanent element of economic policy." In practice this means that the structure of industrial production will be modified to ensure the priority of agriculture, with greater emphasis on the production of agricultural capital goods, manufactured fertilizer, plant protectants, spare parts, etc. (The entire increase in the output of mixed fertilizers will be allotted to private farms.)

In conjunction with this, of course, it is necessary to solve extremely complicated price-policy tasks. In particular it is necessary to find suitable ratios between the state purchase prices of farm produce, the prices of industrial capital goods for agriculture, and food prices--all this amidst the stresses of market anarchy and shortages.

On the basis of the analyses exploring the causes of the crisis, the volume of investment will be reduced significantly, and it will not be able to increase through the end of 1983. Essentially the investment program will be suspended temporarily. Only those projects will be completed that can realistically be placed in operation before 31 December 1982. Furthermore, power plants and coal mines; and investment projects that serve agriculture, the food industry, export, and the immediate needs of the population.

As of January 1982, according to the government's economic reform plan, the basic branches of the Polish economy will already be functioning pursuant to the new concepts. Changeover is complicated by the fact that in the first two or three years, regarded as a transitional period, central allocation

might be necessary of certain raw materials, important consumer goods, and foreign exchange. This raises the extremely complicated relationship that such allocation is in conflict with the economic reform's long-term objectives and economic-policy intent, yet it cannot serve as a pretext to postpone reform. Such unavoidable internal contradictions should be resolved by the Office of the Commissioner for Reform. (It is headed by Professor Wladyslaw Baka, who played a prominent role in the work of the Economic Reform Committee).

With Social Cooperation

The situation, then, is as the Warsaw economic weekly ZYCIE GOSPODARCZE summed it up: "Reality, with all its conflicts and with the catastrophic economic situation, is simultaneously a challenge for reform." But this challenge, even in its economic manifestations, has assumed the nature of political power. It is typical that even such an organ of political and economic conservatism as THE ECONOMIST of London evaluates the situation as follows: "The Polish government is attempting to come to grips with the country's economic problems . . .. But until Solidarity shows a greater sense of reality, the Jaruzelski government is unable to begin curing the disintegrating Polish economy. The question is whether Solidarity is bold enough to recognize those limits of its own freedom of action that are forced upon it by economic necessity, besides geography and history."

Naturally, THE ECONOMIST uses its own terminology and political preferences. But even so, its diagnosis does not differ essentially from what the already mentioned ZYCIE GOSPODARCZE wrote after a recent session of the Economic Reform Committee: "The government strongly emphasizes that the catastrophe threatening the collapse of the entire economy can be prevented only with the cooperation of all the forces within society. The government is fully aware that it is requesting the nation to support a program that initially will not produce any perceptible favorable changes, and will even demand intensified effort and huge sacrifices. But there is no other way of overcoming the crisis. The government is presenting its action program and expects society to actively begin its implementation."

1014
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MEASURES TO INCREASE PRIVATE SECTOR AGRICULTURAL PRODUCTION

Bucharest REVISTA ECONOMICA in Romanian 9, 16 Oct 81

[Article by Dr N. David and Dr I. Alecu: "The Full Use of Resources for Increasing Production on the People's Farms" (Parts I and II)]

/9 Oct 81, No 41 pp 7, 9 Part I/

[Text] An Important Production Potential

In referring to the private agricultural farms in the non-cooperativized hill and mountain regions, in his speech at the Second Agricultural Congress comrade Nicolae Ceausescu stressed: "With regards to the measures undertaken to date, it is necessary for the agricultural producers in these regions to receive more assistance in order to obtain increased production. The town agricultural commissions must have a more active role in organizing production and in having the best possible use of the conditions available to agriculture in these regions."

Although the percentage of this sector in the total amount of agricultural surface-area is only five percent, because of its pastures, hayfields and orchards it plays an important role in zootechny and in fruitgrowing, while at the same time having a significant place in potato growing.

Multilaterally helped by the socialist state, the private agricultural farms in the non-cooperativized regions make a significant contribution to the creation of the fund of agricultural products. Thus, at the beginning of last year, the private agricultural farms had the following percentages of the number of animals: 15.9 percent of cattle, 5.8 percent of pigs, 14.3 percent of sheep and 12.1 percent of fowl. In the total amount of 1979 animal production, they contributed 11.7 percent for meat production; 19.2 percent for milk; 12.2 percent for wool; 15.6 percent for eggs; and 35.7 percent for honey. In the same year, these farms accounted for significant percentages in the total vegetable production specific to the hill-mountain regions: 27.3 percent for fruits, 22.7 percent for potatoes and so forth.

Another category of farms having a large production potential, especially because of the availability of labor and the existing production facilities, is the personal plots of the members of the agricultural production cooperatives. They

use 6.3 percent of the country's total surface area for their personal-use lots, representing the following: 30.1 percent of the vineyards and wine-growing nurseries, 7.8 percent of the arable surface area, 6.9 percent of the orchards and tree nurseries and 3.3 percent of the natural pastures. Of the total number of animals, these farms have 23.7 percent of the cattle, 17 percent of the pigs, 27.9 percent of the sheep, 30.9 percent of the fowl and 41.2 percent of the bee hives. In 1979, they produced 29.2 percent of the meat, 36.1 percent of the milk, 29.6 percent of the wool, 43.2 percent of the eggs and 53.5 percent of the honey.

At the same time, they are also noted for their degree of raising certain crops using a low level of mechanization that is specific to using small plots or plots surrounding a house. For example, they produced 40.3 percent of the total amount of fruit in the country, 36.9 percent of the potatoes, 35.7 percent of the vegetables, 32.1 percent of the grapes (of which 81.8 percent were hybrid varieties) and so forth.

The private plots of the cooperative members are closely dependent upon the public farming of the agricultural production cooperative, from which they receive grains, fodder and other products that they use to raise animals and, in many cases, they also receive seeds, saplings, chicks, clippings, piglets and so forth.

There is also a certain production potential in the farms of the numerous workers and office personnel in rural and urban areas where, on the land surrounding their homes, they cultivate different plants and raise animals both for their own needs and for sale at the markets or to the state fund. All these categories of private farms and all those persons owning land or having plots to use are obligated, in accordance with the country's laws, to cultivate the entire surface area and to raise animals and fowl for the purpose of meeting their own consumer needs and contributing an ever more significant amount of products to the state fund.

In criticizing the fact that in some counties and towns the appropriate attention has not been given to using the products of the private farms and that the number of animals, especially cattle, has decreased on this category of farm, comrade Nicolae Ceausescu pointed out that it is necessary for all those all live in villages (including doctors, engineers and workers in the non-agricultural sectors) must raise animals and work the earth: "Let us give the appropriate attention to the private sector and to cultivating the existing areas in the villages and cities. There should not be a single square meter not being worked! Let us turn over the land to the enterprises, the workers, cooperative members or peasants - I am referring to small, isolated areas of land - so they can work the land and obtain an appropriate production."

This, therefore, is why, concomitantly with the consolidation and development of production in the socialist agricultural sector, it is necessary to have a complete, better use of existing resources in the private farms, whose contributions are especially important in improving the supply of agro-food products to the people and raw materials to industry.

Measures to Increase Plant Production

The most widely grown crops on private farms are vegetables and potatoes (46.7 percent of the total amount of arable land on privately-owned land and on plots being used). The private farms cultivate approximately half (44.2 percent in 1979) of the total area in the entire country involved in the production of potatoes, vegetables and melons. This shows the importance that local agricultural organs must place on helping them in applying agro-technical principles, increasing their efficiency per unit of surface area and delivering the largest possible amounts of products to the state's central fund.

The analysis of the evolution of the surface areas and production of the main crops and plant varieties on the private farms (see Table No 1) shows that during the 1965-1979 period on the plots of the cooperative members the area planted with potatoes, vegetables and melons fell by 3.4 percent and for viticulture by 10.7 percent. Nonetheless, because of the multiple ties and helped received from the state and the public farms of the agricultural production cooperatives, total production increased during this period by 118.5 percent for potatoes, 174.8 percent for vegetables, 72.2 percent for grapes and 18.2 percent for fruits, achieving average harvests per unit of land higher than the country's average. As a result, the private plots of the cooperative members account for a higher percentage in total production than in the total amount of land cultivated. Thus, in 1979 for potatoes their percentage of the total production was 36.9 percent while the amount of land was 31.9 percent, and for vegetables the figures were 35.7 percent and 27 percent, respectively.

Table No 1

Evolution of Land Areas and Production for the Main Crops on Private Farms

	1965	1970	1975	1979	1979/1965 (%)
Suprafața cultivată (mii ha) (1)					
În gospodăriile personale ale membrilor C.A.P. (2)					
— cartofi, legume, pepeni (3)	173.3	164	156.7	169.6	96,7
din care: — cartofi (4)	102.8	95	89,7	93,8	91,4
— legume (5)	67.5	65,6	62,9	71,8	106,3
În gospodăriile agricole individuale (6)					
— cartofi, legume, pepeni	70,7	70,4	73,9	83,7	118,4
din care: — cartofi	34,7	57,7	58,4	63,3	115,7
— legume	13,9	12,8	18,9	20,2	127,8
Evoluția producției totale (mii tone) (7)					
În gospodăriile personale ale membrilor C.A.P					
— cartofi	769,9	711,7	969,9	1 682,8	218,5
— legume	458	330,5	908,9	1 250,5	274,8
— fructe (8)	323.7	473,1	398,2	382,5	118,2
În gospodăriile agricole individuale					
— cartofi	307,9	318,3	446,0	1 034,8	335,9
— legume	105	107,1	189,7	310,1	295,3
— fructe	348,9	320,4	221,1	505,1	144,9

[Key follows on next page]

Key:

1. Land area cultivated (thousands of hectares)
2. On the private plots of members of agricultural production cooperatives
3. Potatoes, vegetables, melons
4. Of which: - potatoes
5. Vegetables
6. On private agricultural farms
7. Evolution of total production (thousands of tons)
8. Fruit

With regards to private agricultural farms, despite the fact that the average efficiency was less than the national level, nonetheless there was a net trend of growth both in the land area cultivated and in the per-hectare production, which attest to the great possibilities and reserves that exist in this sector. The achievement of certain increased levels of production on private farms under conditions of economic efficiency both for the producer himself and for society requires the acceleration of the implementation of certain technical-organizational and economic measures, including:

- the provision of seeds (for vegetables, sugar beets, vegetable-like plants), cuttings, saplings, seed potatoes and so forth, from the most productive soils and that are differentiated by agricultural regions from the point of view of their hardiness and the growing technology used, that can be sold to the people at reasonable prices;

- the organization of the production of nursery stock (which requires a training, investments and special facilities that are more difficult to have in each farm) in firms of specialized enterprises (IPILF), agricultural cooperatives, state agricultural units, experimental stations, horticultural enterprises in the municipalities or cities and so forth, so that the citizens who wich to grow vegetables can find nursery stocks in the widest varieties and at agreeable prices;

- the production of tools and special materials needed for growing vegetables, potatoes and other plants on small land areas in the necessary amounts and types;

- the organization, in the non-cooperativized hill and mountain regions, of certain stations or sections for mechanized agricultural work equipped with machinery and tools appropriate for the crops in that region that can be used to carry out work on the land and in the fields of the private agricultural farms and agricultural associations;

the grouping of certain land areas planted with vegetables, potatoes, sugar beets and other crops for the pupose of jointly carrying out projects for irrigation and combatting pests;

- the extension of the organization of fruit tree growing associations in the hill-mountain regions with the role of working to establish modern orchards, to carry out maintenance, harvesting and storage projects under better conditions using mechanical means and to better use the production.

/16 Oct 81, No 42 pp 8-9 Part II/

[Text] Increasing Animal Production

Among the principal priorities for agriculture during the current five year plan, there is special importance placed on animal production, whose percentage in the total amount of agricultural production is to reach 45-46 percent by 1985 and 50 percent in 1990.

The measures that are being taken to achieve this qualitative leap involve all the departments of activity regarding the organization of reproduction, the provision of a fodder supply and the necessary shelters, the growth of training and incentives for those caring for the animals, the introduction of the most advanced and efficient technologies and so forth, as well as all the social-economic sectors of agriculture.

The analysis of the evolution of the numbers of animals in private farms (see Table No 2) shows that during the 1965-1979 period the number of animals on the private farms of cooperative members decreased by approximately 500,000 pigs, over 500,000 sheep and nearly 40,000 young bulls. On the other hand, animal production had a constantly upward evolution as a result of improvements to the breeds and the manner of using the animals, with the increases in production being: 56 percent for meat (live weight), 51 percent for milk, 34 percent for wool, 88 percent for eggs and 112 percent for extracted honey.

With regards to the private agricultural farms in the non-coopertivized regions, these farms increased both the numbers of their animals and animal production.

In recent years, measures were adopted and principles applied designed to help and stimulate the private farms in raising animals. Thus, Law No 40/1975 regarding the raising of and caring for animals states that the state helps the development of raising animals on private farms, providing stud services or seminal materials (through community breeding stations), technical assistance and financial resources for improving and caring for natural pastures, credit under advantageous conditions for the purpose of procuring animals or buidling shelters, the right to use state-owned pastures and hayfields under advantageous conditions, some varieties of fodder for animals and products contracted for with the state, bonuses for the first heifer of the first calfing, specialized technical guidance and veterinary care and medicines for veterinary use.

Table No 2

The Numbers of Animals and Animal Production on Private Farms

	1965	1970	1975	1979	1979/1965 %
EFECTIVUL DE ANIMALE LA SFÎRŞITUL ANULUI (mii capete) (1)					
Gospodării personale ale membrilor cooperatori (2)					
Bovine (3)	1 364,5	1 530,6	1 703,0	1 345,1	97,5
din care : — vaci, juninci (4)	830,1	810,7	892,1	874,1	94,0
Porcine (5)	2 351,8	1 883,4	1 832,3	1 855,1	78,9
Ovine (6)	4 938,2	4 914,8	4 478,5	4 109,2	83,3
Caprine (7)	602,4	418,7	338,2	268,0	44,0
Păsări (8)	24 248,5	31 046,4	28 587,4	29 482,2	121,6
Albine (mii familii) (9)	422,5	447,5	392,9	438,9	107,8
Gospodării agricole individuale (10)					
Bovine	810,9	828,7	943,8	1 085,7	137,7
din care : — vaci	402,5	431,1	494,9	512,2	127,2
Porcine	572,2	519,5	571,2	801,4	139,8
Ovine	1 682,6	1 730,6	1 884,2	2 266,7	134,7
Caprine	201,7	122,1	105,5	107,6	53,3
Păsări	7 807,5	10 123,4	8 301,1	11 144,4	174,9
Albine (mii familii)	271,4	329,1	270,0	408,1	148,8
PRODUCŢIA ANIMALIERA (11)					
Gospodăriile personale ale membrilor cooperatori					
Carne (mii t) (12)	481,0	588,9	690,0	750,0	155,9
Lapte (mii hl) (13)	13 108	14 105	16 733	19 812	151,3
Lînă (t) (14)	8 239	9 056	9 861	11 070	134,4
Miere extrasă (t) (15)	1 630	2 094	2 624	3 062	187,8
Ouă (mii buc) (16)	3 681	3 489	3 899	7 818	212,4
Gospodăriile agricole individuale					
Carne (mii t)	129	177	250	291	225,2
Lapte (mii hl)	5 206	6 458	8 681	10 327	202,2
Lînă (t)	2 571	3 144	3 684	4 543	176,7
Ouă (mii buc)	586	661	726	1 104	188,4
Miere (extrasă (t)	2 160	2 537	3 393	5 212	242,6

Key:

1. Number of Animals at year's end (thousands of head)
2. Private farms of cooperative members
3. Cattle
4. Of which: - cows, heifers
5. Pigs
6. Sheep
7. Goats
8. Fowl
9. Bees (thousands of hives)
10. Private agricultural farms
11. Animal Production
12. Meat (thousands of tons)
13. Milk (thousands of hectoliters)
14. Wool (tons)
15. Extracted honey (tons)
16. Eggs (thousands)

Keeping in mind the experiences of the outstanding producers and the results of scientific research, we can formulate a series of measures for the purpose of putting to better use the increased potential of animal production on the private farms:

a) appropriately organizing reproduction and achieving certain breeds and hybrids adapted to the specific nature of the private farms and the different production regions. For example, there is the need provide mixed breed chickens (or hybrids of them) that will use very well the existing resources on the private farms and that are preferred by those people raising chickens compared to specialized breeds. Similarly, all the breeding stations will acquire studs from breeds that have been improved and adapted to local conditions and in the mountainous regions they will also have stud horses (eventually becoming a system of "stud storehouses");

b) supplying the private farms with day-old chicks and piglets, an especially important problem given the difficulties of the high unit cost of obtaining these within each separate farm. In this regard, the Law regarding the raising of and caring for animals establishes the task for the Ministry of Agriculture and the Food Industry, together with the people's councils and the consumer cooperatives councils, to help in the organization of the production of piglets, chicks and other species and categories of animals, both within the framework of the private farms and within the framework of the animal raising associations or through the local consumer cooperative;

c) organizing cooperative sheep pens that will provide grazing lands to be used in common by the sheep belonging to the private farms. The consumer cooperative, which has the responsibility for organizing the cooperative sheep pens, will take care of maintaining the pastures, provide shelters for the animals, process and use the products, retaining for these services a certain portion of the quantity of product produced.

The raising of sheep, one of the oldest professions and most wide spread among the private farms, enjoys the attention and support given by the state by way of eliminating taxes, assigning the necessary pasture lands, having stimulative prices and so forth. These measures contribute to the growth in the number of sheep on the private farms and the quantities of products in socialist trade. In Iasi County, for example, as a result of the efforts of the consumer cooperative over a number of years, there currently are approximately 300 cooperative sheep pens. In 1980, they organized the grazing of approximately 200,000 sheep and this year the number is projected to reach 210,000;

d) using as much as possible in animal foods the residues from the food industry and the waste food from cantines and public food units. For the purpose of carrying out certain efficient activities, it is necessary to draw up certain technical-economic plans whose bases will keep in mind the specific nature and peculiarities of this activity, the reduced sizes of the farms, the possibilities of using certain shelters being built that were to be used in other ways, the means of procuring animals for reproduction or for fattening, the provision of the necessary fodder during periods when cantines or restaurants are not operating, the provision of certain minimum amounts of concentrated fodder that is to be administered as a supplement to that coming from waste food, methods for collecting, transporting

and sterilizing waste foods, problems regarding the organization of production and work, the use of production and so forth, so that the specific amount of consumption of fodder in order to obtain a unit of product and the costs of production will favor economic-financial self-administration;

e) developing certain zootechny branches in the private farms having a small percentage of total production, but whose products are in great demand on the domestic and foreign markets, such as: beekeeping, sericulture, cuniculture, raising small animals for their fur and so forth.

Providing Fodder

The rates of growth in the number of animals and animal production are decisively influenced by the level of supply of fodder. Although the problems of supplying fodder necessary for raising animals in the private farms are different in the plains areas than they are in the hills-mountains regions, different in the private plots of the cooperative members than in the private agricultural farms in the non-cooperativized regions or than in the farms of the workers and office personnel in the rural regions, one common trait is the need to use all the existing fodder resources in the region under the best possible conditions and to increase the production of fodder so that there will be a better use of the production potential of each farm, increasing the level of supply of animal products for each family and locality and increasing the quantities delivered to the state fund.

The most important action in this field is the complex improvement and better use of the 4.4 million hectares of natural pastures and hayfields, a good part of which is used by or owned by private farms. If on the plains, beginning this year, it is now mandatory to carry out a periodical reseeding of pastures and hayfields, on hilly grounds we must proceed with a super-seeding concomitantly with harrowing, fertilizing, draining and so forth. In many hilly and mountainous regions, by improving the pasture lands there has been a doubling and even a tripling of the amounts of fodder.

The best results are obtained when the alpine pastures are assigned to persons raising animals, especially associations, over a long period of time. This leads to the growth of incentives to carry out projects that are required for the purpose of increasing fodder production.

For example, the animal breeders association in the town of Dimbovita in Arges County, by improving the natural mountain pastures at an altitude of 1,500 to 1,700 meters produced 20 to 30 tons of fodder per hectare. This association is not limited to just improving and jointly using the natural pastures, but at the same time processes and uses milk, ensuring good product quality and increased income. In fact, Arges County, where in recent decades there has been a permanent concern for improving the natural pastures, is in the top ranks nationally with regards

to raising young bulls and sheep. Thus, with a density of young bulls (59.1) and cows (3.2) per 100 hectares of agricultural land, Arges County is in third place, while for the average annual production of milk per cow it is in first place, with 2,375 liters (1979).

A significant contribution in providing the necessary fodder for the private farms of the cooperative members is made by the assignment of the necessary amounts within the framework of a natural distribution.

The procedure of distributing fodder from the production achieved during harvest using a percentage quota, especially during periods of abundant rains (at the first cutting of clover or natural hay in the hills-mountains regions, as well as for harvesting stalks) is very advantageous both for the agricultural production cooperatives and for the cooperative members. It stimulates the carrying out of the harvest in a short period of time and the achievement of drying, transporting and storing under better conditions, increasing the amounts of fodder available for the public farms of the agricultural production cooperatives and for the private farms. At the same time, they get more hay from the fields planted with trefoil and clover or from the natural hayfields and they more quickly finish with the lands that are to be plowed and seeded for fall.

Both on the plains and in the hills and mountains, it is necessary to expand the intensive fodder crops that are of high productivity in the private farms, such as: trefoil, clover, mangold, turnip cabbage and so forth, from which they can obtain large quantities of nutritional substances per hectare cultivated. To this end, it is necessary to increase the efforts of the agricultural organs, the consumer cooperatives and the people's councils to spread the most appropriate technologies, differentiated by region, and to supply the necessary seeds and tools needed to cultivate, maintain and harvest fodder crops.

It is, similarly, necessary to expand the production, supply and delivery to the private farms of less complex technical tools and means (cleavers for mangolds and turnip cabbage, pounding mills and so forth), with which they can prepare the fodder prior to it being mixed into the animal feed. Another current requirement is the supply of urea and yeast as fodder, premixes and other ingredients needed to enrich the raw fodder or the hay of a poor quality.

The specialized literature and experience call for the enrichment of the raw fodder and poor quality hay, a procedure that can replace up to 20 percent of the necessary amount of protein in animal feed. Some of the difficulties in obtaining the urea for fodder, as well as the danger of certain errors in administering it that can cause poisoning, have resulted in this method being practiced in only a small number of units.

From this point of view, we see as very valuable the experience accumulated by the breeders of the young bulls being fattened in the town of Suici in Arges County, under the direct guidance of specialists from the agro-zooveterinary

district. They fattened and delivered to the state fund in 1980, 142 bulls that had achieved an average daily increase of .8 to 1.1 kilograms. For the purpose of implementing these methods, measures were taken regarding training the breeders, obtaining the urea, organizing the production of ground corncobs right at the district headquarters and so forth.

For the purpose of increasing the protein content in the consumability and digestibility index, different physical (grinding, soaking, steaming, salting, blending), chemical (treating it with alkalines or with acids) biological (fermenting) and other methods can be used whose values have been demonstrated by the experiments conducted by different scientific research institutes and pioneer units. To expand their use in practice, actions are necessary of a technical, organizational, economic and propaganda nature.

Another less used source of fodder in recent years are the natural pastures in the areas of the forests. At the Working Conference on Agricultural Problems at Brasov in January of this year, it was established that, along with the measures required to protect the forests, there will be a greater concern for the appropriate use of this resource, with the secretary general of the party indicating that each year the Ministry of Agriculture and the Ministry of Forestry Economy will establish the areas for pastures, of 2.5 to 3 million hectares. In addition to the appreciable quantities of fodder that can be produced on this area, the forests also offer other sources of fodder less used in recent years: raw materials for compost or for pine cone meal, acorns, beechnuts and so forth.

One problem that interests not just the private farms is the efficient use of secondary products resulting from the industrialization of milk: whey, buttermilk, no-fat milk and so forth. The organization of small processing facilities at the level of a unified agro-industrial council or for two to three towns would reduce the distances required to transport the milk to the factories and the by-products to the animal breeders, bringing about the more complete use of the milk, along with reducing costs, fuel consumption and losses during transportation. If there also is a spread of the use on private farms of no-fat milk or milk substitutes (Inlavit) in animal feed, there will be an increase in the amount of milk products and a better development of the animals as a result of extending the period of suckling.

The animal breeders, as well as the agricultural guidance and management organs, must direct their attention to these aspects and others which we did not mention in order to have a better supply of fodder, an essential condition for increasing the number of animals and the production from them.

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CSO: 2700/51

EFFECT OF INFORMATION SYSTEMS ON ECONOMY DURING 1971-1980

Bucharest REVISTA ECONOMICA in Romanian No 40, 2 Oct 81 and No 41, 9 Oct 81

/Article by M. Draganescu and N. Badea-Dinca, Central Institute for Management and Data Processing: "The Computerization of the Economic and Social Structures--Achievements, Effects, Prospects" (Parts I and II)/

/2 Oct 81 pp 18, 21 Part I/

/Text/ We are not far from the time when information in an electronic form will be recognized as the most important resource for growth in productivity. Along with fixed assets, power, raw materials and supplies, information is now becoming a production factor, a factor that changes the mode of operation of the others in such a way that a production microsystem (the production system on a microeconomic scale, the enterprise) can attain as efficient operating conditions as possible. Computerization is closely connected with automation and cybernation and is one of the factors of the new quality sought by the documents of the 12th Congress of the Romanian Communist Party in the new period defined as "the decade of science, technology, quality and efficiency."*

The modern economy and industry can no longer progress without data processing, microelectronics and automation; it is sometimes stated that the salvation of contemporary industry depends on data processing, on information technology.** Of course, it is necessary to take into account not only data processing but also its combination with robotics and flexible automation, but the essence of the problem remains the same, the utilization of electronic information.

It is well known that in the 1971-1980 period, a primary stage in the computerization of the Romanian economy, action was taken in conformity with the tasks in the decision of the plenum of the RCP Central Committee in April 1972, the programs set up for data processing, the other party and state documents that referred directly or

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* Nicolae Ceausescu, "Raport la cel de al VII-lea Congres al Partidului Comunist Roman" /A Report to the Seventh Congress of the Romanian Communist Party/, Bucharest, Politica Publishing House, 1979.

**"Information Technology Seen as a Salvation of Industrial Britain," COMPUTER WEEKLY, 12 March 1981 (Kenneth Baker, the new minister of state for industry in Great Britain, states that information technology will be the salvation of English industry).

contextually to data processing, and the tasks and instructions given by the secretary general of the party, Comrade Nicolae Ceausescu.

There was thus undertaken the formation of the data-processing infrastructure of our economy and society, which contains differentiated categories of data-processing systems, as follows: data-processing systems for running and assisting the technological processes by means of the computer; data-processing systems for running the enterprises and other economic and social units; data-processing systems for running the centrals or the units equivalent to them; data-processing systems for management in branch form; data-processing systems for management in territorial form; data-processing systems on a national scale; data-processing systems for conducting general functions of synthesis at the level of the national economy; and the national data-processing system.

In correlation with the degree of experience and the possibilities of the technical structure that was on hand, data processing was promoted and progressed primarily on a microeconomic level. This was done, in fact, in complete accordance with the task of orienting the computerization process mainly in support of production.

Against the background of a unitary conceptual and methodological evolution suited to the stage traversed, over 1,200 data-processing systems were designed and put into operation by the end of 1980, to which are added another 2,000 economic, social and cultural units that have access--through different applications--to computer technology. On the other hand, systems and applications were designed and put into operation in a differentiated fashion on a macroeconomic scale in industrial construction, power, metallurgy, transportation and telecommunications, technical-material supply and chemistry and for the conducting of functions of synthesis on a national scale--planning, finances and credit, statistics--or in territorial form in many counties of the country and municipalities, especially the municipality of Bucharest.

Begun as an action to modernize the activities of administration and recordkeeping, computerization progressed during the last period in fields directly connected with material production. It thus became possible, benefiting also from the rationalization and automation of recordkeeping work, for the management of production and activities associated organically with it to occupy the central place within 648 data-processing systems (54 percent of the total) at the end of last year (see Figure 1).

Scores of applications for running with the computer the technological processes in chemistry, metallurgy, electric power, cellulose and paper, the food industry and so on were designed and put into operation.

In reference to the achievement of data-processing systems and the utilization of computer technology, some opinions that judged this process as being slow in relation to the requirements or the anticipated effects were also expressed. In interpreting this relative dissatisfaction with the value and use value of data processing, one must not overlook the complexity of the computerization process, which, in the respective period, meant at the same time the accumulation of experience specific to our economy, the training of the specialized work force (see Figure 2) and of that which is called upon to use computer technology, and the fact that it was necessary to achieve a balanced--as far as possible--infrastructure in the geographical and functional space of the country. At the same time, automation, cybernation and the complex process of the introduction of modern means of computation required the parallel preparation and adaptation of the object systems.

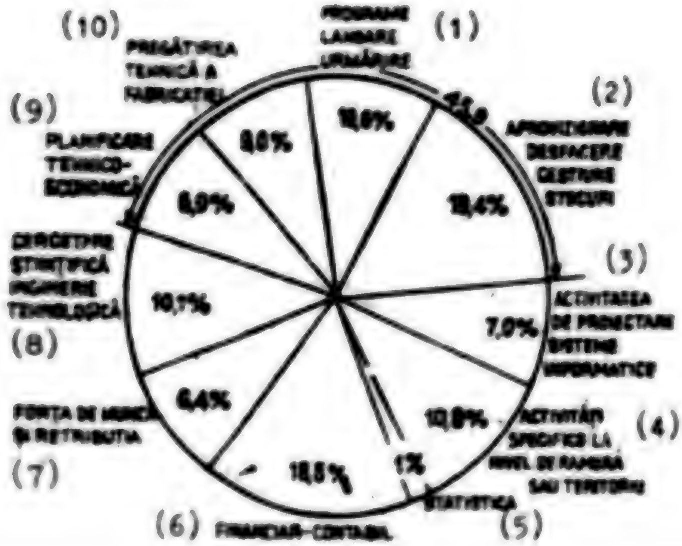

Figure 1. The Utilization of Computer Time According to Functions of the Enterprises and the Main Activities Served

Key:

1. Schedules, launching and supervision
2. Supply, sales, management and stocks
3. Activity of design of data-processing systems
4. Specific activities at a branch or territorial level
5. Statistics
6. Finance and accounting
7. Work force and remuneration
8. Scientific research and technological engineering
9. Technical and economic planning
10. Technical preparation for manufacture

It can be judged that a flexible adaptation, in progressive stages, of the organizational structures of the units in data processing to the evolution of the available equipment, methods and techniques and of the data-processing applications was provided by means of a coordinated effort on the scale of the national economy.

We can thus state that we now possess good data-processing experience, concretized, as has been indicated, in many practical systems, and that we possess a valuable supply of data processors and, lately, users with experience and initiative. Along this line of thinking, over 1,500 data-processing units, including 117 computer centers, 1,002 offices and 468 stations, now function on various levels of the economic and social structure.

In the last decade, on the basis of the better utilization of computer technology, of the growth of the level of training and productivity, and of the better management of resources, the average rate per computer hour fell systematically, helping to reduce the expenses generated by the processing needed for obtaining the information (see Figure 3).

In the field of the production of computer technology, one should note the effort to create the national industry, which involved not only big investments but also a steady activity of conception. In relation to the needs, the equipping of the

national economy experienced quantitative and qualitative progress, which is presented in Table 1.

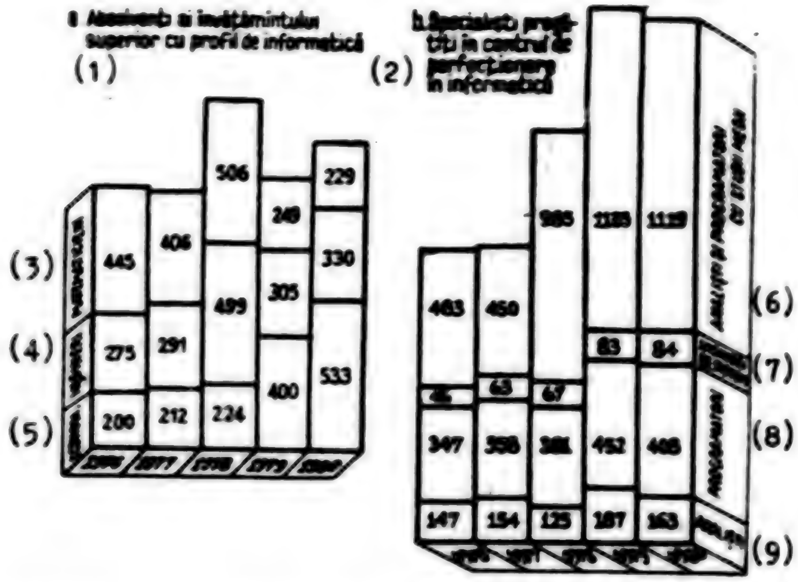

Figure 2. The Training of the Specialized Personnel in Data Processing

Key:
1. Graduates of higher education with a speciality of data processing
2. Specialists trained in the center for advanced training in data processing
3. Mathematicians
4. Engineers
5. Economists
6. Analysts and programmers with middle studies
7. Systems engineers
8. Programmers
9. Analysts

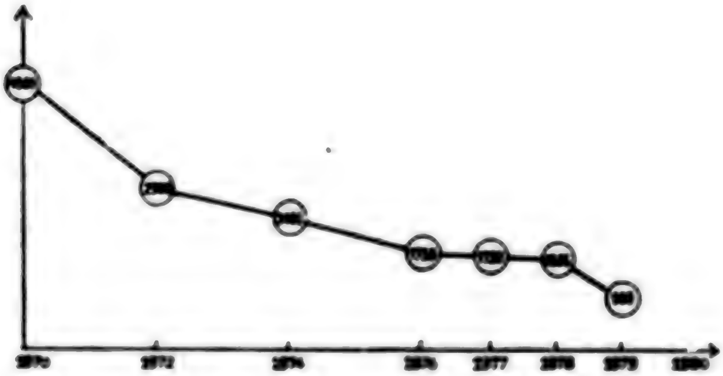

Figure 3. The Evolution of the Average Rate per Computer Hour

The equipping with computer technology was done in conformity with the priorities of designing and implementing the data-processing systems. However, we must not ignore

the fact that we did not manage to provide in all counties and even in all branches an agreement between the industrial structures and the data-processing ones.

Table 1. The Equipping of the National Economy with the Main Types of Computer Equipment

	Existing in 1975	Existing in 1980
Medium and big computers	140	380
Minicomputers	6	52
Microcomputers	-	160
Posts for data-input systems	-	48
Terminals	-	1,000

The computers installed in the network of the Central Institute for Management and Data Processing took up and, in many cases, completely met the need for automatic data processing, for enterprises in all branches, for the local and central administration, becoming a true national resource.

Begun more timidly, the research activity progressed greatly from the viewpoint of the results and of the introduction into production, both in the units of the ICI [Central Institute for Data Processing], the ITC [Research Institute for Computer Technology] and the IPA [Automation Design Institute], in education and other data-processing units.

The main efforts of the ICI were oriented mainly toward the investigation and solving of the problems derived from putting data-processing systems into operation on a micro- and macroeconomic level, the preparation of program products on a basis of model designs and reusable or general-purpose programs, the preparation of systems of data-base management and systems of programs for running the technological processes by utilizing micro- and minicomputers, toward new methods and techniques for data processing, including the computer-aided design of data-processing systems, there not being ignored either the basic aspects connected with data processing for robotics, with artificial intelligence and with the theoretical bases of data processing. Some solutions in the interconnection of computers, teleprocessing and data transmission were begun and finalized and methods and means of interactive preparation of programs and various programs for mini- and microcomputers were finalized in a primary stage.

We now possess a supply of applicative programs generalizable on a national or sectorial scale. They were specialized functionally, and versions generated by certain classes according to the specific character of the equipment, algorithms and methods, the organization and administration of data, and the processing techniques are set up within each function.

For the activity of technical and technological design, where data processing constitutes a strong factor for growth in labor productivity, research was initiated and easily assimilable, dedicated languages and data-processing programs for the utilization of computer technology, including graphics, were prepared, and libraries of programs and data bases oriented according to fields and branches began to be set up.

To these achievements is also added the steady activity of disseminating the results obtained and standardizing the knowledge, performed through the organization of

scientific sessions, some becoming national, such as "Data Processing and the Requirements for Economic and Social Development," organized by the ICI, the Symposium on Data Processing and Management in Cluj-Napoca, the symposium "Applications of Data Processing for Research and Design in Construction," and so on. Many discussions, work conferences, exchanges of experience and actions of guidance and supervision were organized with management personnel in the economy and leaders and specialists in the data-processing units, both for knowing the achievements and for formulating new requirements concerning research and design in data processing. In addition, beginning in 1980, BULETINUL ROMAN DE INFORMATICA has been published.

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/Text/ In the last 2-3 years, obvious effects of the utilization of computers have begun to appear in the national economy. This is due to an accumulation of experience, to a process of social education in the use of computer technology in the last 10 years, in correlation with a trend of change both in the structure of utilization of computer technology in the economy and in the structure of equipment for each particular data-processing system. These changes began in 1979 and 1980, through the equipping with terminal equipment, microcomputers and minicomputers, which, balancing the structures of supply and utilization of computer technology, permitted the obtaining of more efficient results.

1. In conformity with the entire world experience, it is difficult, if not impossible, to judge quantitatively all the advantages of the utilization of computers. Consequently, it is necessary to accept both quantitative judgments, where it is possible, and qualitative judgments.

Regarding quantitative, physical and value judgments, it is hard to separate what is due to data processing in comparison with what is due to the better organization of labor, the rationalization of production flows, or new technological procedures. The economic effects can be attributed exclusively to one of these factors only in the case in which, in a certain period, action was taken with regard to it alone. As a rule, when two or all three of these factors are involved, the enterprise's management must judge the quota of economic efficiency that is due to each of them. The evaluation of the economic efficiency of the utilization of computer technology is based on this judgment. There are cases in which the economic efficiency can be determined rigorously--for example, in the automation of the technological processes with the help of computers or in research and design. In addition, in the case in which the data-processing factor is predominant, the economic efficiency due to data processing can be evaluated quite correctly.

2. In view of the above, on the basis of the results in our country, it can be stated that data processing has penetrated into nearly all fields of economic and social life, from the level of the common citizen and the industrial, agricultural, medical or educational unit to the level of the central bodies and the management of the ministries, bringing:

Significant savings of material and energy resources, with better management of resources, the supervision of material expenditures and of the utilization of fixed assets, the reduction of tieups and losses from stoppages, of penalties and of unjustified payments for amortization, the reduction of the interest for bank loans, and so on being provided by means of data processing. For example, in 1980, 600 million

cubic meters of methane gas saved on the basis of the data-processing system at the Medias methane gas central; 60,000 tons of conventional fuel through the introduction of the teleinformation system into the operational management of the national power system; 2.7 million lei through the reduction of the tieups of supplies and spare parts at the Suceava IRE [Enterprise for Electrical Networks]; the reduction of the material expenditures by 9.3 million lei at the Hunedoara CS [Iron and Steel Combine] through the application of scheduling and the supervision of production; the reduction of the material expenditures per 1,000 lei of commodity output by 32 lei and of the idle stocks by 50 percent at the Baneasa Enterprise for Radio Parts and Semiconductors. In the Ministry of Technical-Material Supply and Control of the Management of Fixed Assets, the current equipping of the ministry's computer center is being recouped just from the savings of 60 million lei per year achieved in the direct and indirect expenses of the 40 county bases.

In agriculture, through the utilization of the computer in the pedological characterization of the soil, savings of 60 million lei in the pay fund (the equivalent of the labor of 400 people for a period of 7-8 years) and the reduction of the irrigation expenses by 24 million lei, by optimizing the watering systems for 3 million hectares, are estimated. Savings from the better management of material values are also obtained through data processing in the sphere of commodity circulation. Thus, at the Cluj ICRM [Wholesale Trade Enterprise for Metal-Chemical Products], through the analysis of the evolution of the stocks of products at the end of 1980, tieups of 35.6 million for 12 to 24 months were found in an annual stock of 210 million, and through the supervision of the contractual discipline with the suppliers the unit collected 4.2 million lei in penalties. Savings of 2.4 million lei in the pay fund were achieved at the Arad Lathe Enterprise; 700,000 lei per year from the elimination of rejects at the Fagaras Chemical Combine; and 1,080 tons of conventional fuel at the Brasov Railroad Regional Unit through the supervision and daily calculation of the performances and consumption of fuel, with the overall efficiency of data processing being 24 million at the level of the regional unit;

Production increases, through the better utilization of the capacities on the basis of planning, scheduling, launching and supervision with the computer. For example, in 1980, a production increase of 150 tons of copper per year was obtained at the Baia Mare IMMN [expansion unknown] through the apportioning of the mixtures in extraction; an increase of 10,000 piglets per year at the Satu Mare ISCIP [State Enterprise for the Raising and Fattening of Hogs] through the utilization of data processing in the selection of swine; a production increase of 25 million lei per year at the Ploiesti IPL [expansion unknown]; an increase of up to 20 percent in the seasonal periods at the Constanta Enterprise for Vegetables and Fruit; a production increase of 2.3 million lei per year at the Bucharest "Republica" Enterprise; and so on.

The production increases obtained by the industrial enterprises that utilize data processing are estimated to be, for 1980 alone, at least 1 billion lei on a national scale, they also being accompanied, in all cases, by a qualitative improvement in the general functioning of the economic units and enterprises. At the Brasov IUS [expansion unknown], the response time for the rescheduling of production comes to 24 hours, as compared with over 30 days before the utilization of data processing. At the Slatina Aluminum Enterprise, through the utilization of computer technology in the management of production it was possible to attain great promptness, such as 30-35 minutes for scheduling the extraction of aluminum in the 1,200 electrolytic vats, at most 25 seconds for calculating the alloying elements in the charges, 5

minutes for rescheduling the production in one hall (140 vats) and 24 hours for other activities (commercial, financial, contractual discipline). The recovery of the expenses for the application of scheduling the extraction and the calculation of the alloying additive is being done in the first 5 months of operation on the basis of an increase of 4 million lei per year.

In other enterprises too, especially where there was distributed terminal equipment at the points for collecting the data and utilizing the information resulting from automatic data processing, the duration of the scheduling-supervision-rescheduling cycle was cut substantially, lying between 10-24 hours. The response time in the supervision of technological, financial and contractual discipline fell to 24 hours in some enterprises.

In general, data processing brings greater promptness to the decisionmaking on all management levels in the enterprise, thereby increasing the efficiency of the management work, and contributes to the growth of the quality of the products through better supervision of technological discipline, to better maintenance and repair of the equipment in due time, and so on. Many enterprise heads state that the process of the introduction of data processing is irreversible, that it is no longer possible to function without data processing, once it is introduced, except with negative consequences for the enterprise's functioning on the whole. In this regard, it is hard to accept--for example--that at the Brasov Truck Enterprise it is possible to give up processing that totals 1,300 computer hours per month or data-processing applications such as the balance of the filling of the capacities, the launching of the production and of the income and expense budgets according to sections, and the standardized calculation of the prices per component, assembly and product--which, without computer technology, would not be provided in time, that is, with delays that can lead to the disorganization of the activity in a big economic unit.

The statement is also supported by the degree of accumulation, on data-processing supports, of the technological data with a regulatory and economic character that can no longer be utilized without data processing. Thus, in the data-processing system for industrial construction, the data collections have attained considerable dimensions, such as 200,000 assortments of supplies, 80,000 positions of fixed assets with 1.7 million inventory numbers, 60,000 specification standards and 45,000 time standards. Not without significance from a viewpoint of efficiency is the fact that a process of uniform administration of the data collections has been undertaken, even at the level of the branches of the economy, with a possible socialization of their utilization being anticipated.

The new mode of operation of the enterprises is also concretized in the direct access of the users in the production sections and shops and the conception and management departments to computer technology and data processing procedures. In some enterprises in metallurgy, chemistry and machine building, the terminals connected to the computer have become the technical instrument that has replaced the old mode of operation based on files, registers, records and manual procedures. It can be judged that data processing is beginning to constitute the viable support for the generalization of the new economic and financial mechanism, preserving its unitary character and objectifying its sense.

3. Data processing brings great efficiency to the activity of design, a field that will have to be approached with more initiative in the 1981-1985 period. Of the results obtained thus far, it is possible to mention:

Savings of resources by means of computer-aided design: in 1979-1980, 6,000 tons of steel were saved in the construction of 15,000 apartments; between 1976-1980, 12,000 tons of steel were saved in the investments for iron and steel combines, through the application of methods of spatial calculation; and, in the same period, 25,000 tons of steel and 100,000 tons of cement were saved through the utilization of computer technology in the design of prefabricated standard elements, with better solutions from a technical viewpoint and that of the safety of the structures being found in all cases.

The utilization of the computer has proved efficient in a number of construction projects for Libya, the GDR and Cuba or in special construction such as the subway, the nuclear reactor and the multipurpose hall;

Quantitative and qualitative effects regarding the electronic calculation of a large number of design variants, including through interactive work and the adoption of better solutions, which may reflect, in particular, big reductions of material and energy consumptions, and the considerable reduction of the design time (30-40 percent), including the creation of the possibilities of making decisions about the designs in due time.

Computer-aided design is more advanced in the construction field, but there are also positive results in certain fields of machine building, chemistry and metallurgy. For example, at the Buzau ITMPCMP /expansion unknown/, through the computer-aided design of roll trains, the design time and the costs were reduced 60 percent and 40 percent, respectively.

The computer permits the growth of labor productivity by several times in achieving the support for the numerical control of technological equipment, releasing highly skilled labor in all cases. In other cases, it is irreplaceable in the efficient operation and functioning of installations and aggregates of great complexity.

4. Regarding the effects of data processing on personnel, one finds, in particular, a relative saving of personnel, a widely utilized indicator, expressing best the efficiency of data processing from the viewpoint of growth in labor productivity.

The relative saving of personnel is achieved in the context in which the growth of the volume of production is accompanied by the growth of the complexity of the economic methodology, the fast introduction of technical progress, the renovation and diversification of the assortments, and the growth of the intensity and complexity of the interaction of the managed system with the socioeconomic ambient. The traditional factors--training, experience, foresight--have a limited positive influence. As in other fields, one finds that these limits can be exceeded through better technical equipping, through the automation of the work of calculation and recordkeeping, the assisting of the process of analysis and decisionmaking, through the simulation of behavior variants of the managed system--in short, through data processing.

The absolute reduction, too, is quite big, but, as a rule, it does not exceed 15-20 percent in the management, administrative and functional departments, for a volume of activity that, by manual means, would require several times more numerous personnel. The average reduction is also supported by an analysis made at 70 machine-building enterprises where, through data processing, the volume of labor would be reduced as follows: 20 percent in supply, 15 percent in sales and 15-18 percent for warehouses

for supplies and finished products. In addition, part of the administrative personnel can devote themselves to the work of economic analysis, a more and more necessary activity.

In the programs of measures drawn up for improving the organization of production and labor, in order to rationally utilize the worker personnel, reducing the indirectly productive and functional personnel and moving them to material production, an important place goes to the utilization of computer technology in the management of production, the growth of the degree of automation and the improvement of management activity.

The utilization of the computer also leads to significant indirect economic effects and even social ones. In the Brasov financial district, the putting of the payment of taxes on the computer led to an average collection time of 1 minute, as compared with 15-20 minutes in the manual system. Part of the time gained, 150,000 hours, is time recovered for the activity of production or recreation by the 45,000 citizens. In Tirgu Mures, ever since the payment of the charges for telephone calls was put on the computer, the number of complaints has fallen from several thousand for the manual system to a few score for the data-processing system. At the Brasov branch of the National Bank, although the volume of operations has doubled and the work force has shrunk 10 percent in the last 10 years, the work of the banking apparatus has been simplified, 10,000 man-hours per year that were used beyond the work schedule have been eliminated and, at the same time, the quality and promptness of the data processing have increased.

It can be said that data processing can help to increase the number of directly productive personnel (which will also be decreased in a relative fashion through automation), thus to generally increase labor productivity and, both directly and indirectly, to provide for the progressive reduction of the duration of the workweek for all working people in the country.

5. One of the merits of the utilization of data processing is also that the activity in this field can be put on economic bases. From this viewpoint, the investments in the data-processing field experience a rapid recovery. For example, in the last 10 years, the Central Institute for Management and Data Processing, with an output of about 800 million lei in 1981, having fixed assets of about 2 billion lei, has recovered, through profits, nearly the entire up-to-date computer technology (1,288 billion lei in profits, as compared with 1,416 billion lei in amortization funds, according to the legislation). On the other hand, analyzing the main indicators of the institute, one can judge that in a short time, through the continual growth of labor productivity, data processing has provided for itself not only economic autonomy but also high profitability. The expenses for the data-processing system were recovered in 1.27 years at the Brasov IUS, in 1.7 years at the Slatina IA [Truck Enterprise] and in 1.3 years at the Tirgu Mures IMATEX [expansion unknown]. The recovery period varies between 1 and 5 years.

It can be mentioned that in many enterprises the unit cost of electronic information is lower than in the manual systems. Thus, the cost of data processing in the process of supervising the expenses generated by the selection and reproduction of animals in zootechny comes to 8 lei in the variant with the computer, as compared with 30 lei in the manual system, leading to an absolute saving of 9 million lei per year. In posts and telecommunications, the cost of the processing of one invoice has fallen

by 2 lei, permitting the obtaining of net savings between 0.5-0.8 million lei at the level of the county directorate.

It should be mentioned that, in 1980, steps were taken regarding a certain limitation of the personnel in the data-processing field, especially through the replacement of the operators of invoicing and accounting machines with the specialized personnel in the functional departments, so that the data-processing instrument may become accessible and natural to wider and wider categories of working people.

6. In the future, data processing will help to reduce paper consumption through the utilization of new types of equipment for collection and introduction of data, avoiding punchcards and a number of paper documents that will no longer prove necessary, and of a suitable mode of operation through the utilization of distributed data-processing systems, tele-data processing and so on. Such possibilities will also begin to manifest themselves in our country, starting in the 1981-1985 5-year period, under the conditions of satisfactory equipping.

Starting in 1978-1979, the design of data-processing systems according to typological groups of units was promoted in many subbranches, reducing substantially the costs per system and thus providing a homogeneous character and a unitary evolution to data processing. In this way, the expenses for achievement dropped from 15 million to 3.5 million lei for an enterprise for electrical networks (IRE), from 230 million lei to 33 million lei for all the garment enterprises, from 86 million lei to 13 million lei for the chemical fertilizer combines and by 60 percent per enterprise in the sugar industry. Things are proceeding similarly in agriculture, posts and telecommunications, financial administration and technical-material supply. However, these effects could not be generalized at all the enterprises in the considered typology, due to the impossibility of providing the necessary equipment. In the next period, by dealing with the tasks for typifying the data-processing programs and applications, in correlation with the reduction of computer prices, it will be possible to further reduce the expenses generated by the introduction of data processing.

In the situation in which sufficient mini- and microcomputers and terminals will be on hand in the next period, it will be possible to achieve complex systems (equipment and programs), reducing the expenses for achievement to 40-60 percent in comparison with the current systems.

In conclusion, we judge that the beginnings of promising economic efficiency in the utilization of data processing that justifies the continuation of the policy of introducing data-processing systems and equipping the economy with computer technology have been distinguished. The problem of efficiency has always concerned the workers in the data-processing field, it starting to be raised on a national level in this 5-year period, the 5-year period of new quality.

The clarification of the theoretical and fundamental aspects of the efficiency of data processing on the basis of our own experience and of the results obtained thus far will permit the defining of efficiency indicators on different levels, including on the scale of the national economy. Some of these indicators will be quantitative, others qualitative. However, the overall efficiency depends on the volume of computer technology, which, in our country, is still low and in an unsuitable structure in relation to the current needs and our possibilities of utilization, the experience of the personnel using this technology and the level of conception and creativity of the specialists who work in the data-processing field.

The wide-scale generalization of these achievements is also conditioned by the possibilities of providing the necessary equipment.

Regarding the prospect of data processing in our country, it can be approached in two ways: an architectural one that offers the view of a certain integrated stage of the national data-processing system through the evolution of its major functions in relation to society and of the consequences of data processing for society, and another dwelling on the steps that we will achieve in ensuing years within the evolutive process of forming the national data-processing system. It is clear that these above two ways are not contradictory, the latter tending to concretize the former. The architectural principle and the evolutive principle (step by step) are combined, guiding our activities of forecasting and planning in the data-processing field. In the 1981-1985 5-year period, the packages of generalizable programs, the data-processing systems with data bases and terminals, the formation of the first sections of the national data-transmission and electronic-computer network, and the first artificial-intelligence programs, including for industrial robots, will be elements of the new quality in data processing.

However, the rapidity of the generalization of certain data-processing systems, computer programs and equipment will depend on the degree of economic efficiency that they produce. From this viewpoint, we expect that greater labor productivity and, at the same time, the devising of technological systems and products with significant economic effects in relation to the earlier products and technologies will be obtained in computer-aided design and computer-aided technological engineering. Ultimately, we will tend toward a production activity aided, on the whole, by the computer, starting with the stages of conception, continuing with the preparation for manufacture, the technological processes and quality control, and ending with computerized administrative activity.

The branch data-processing systems and the functional ones will achieve significant progress, with us managing to also solve inherent problems of coupling between them. The phenomena of interaction between data-processing systems have also begun to appear and will make themselves felt more and more in the future. Their appearance is normal, opening up an important field of action for the computerization of the economic and social structures in their entirety.

In May, a national work conference on data processing in agriculture was held in Arad, there being reviewed the data-processing programs and systems achieved, some in the process of implementation, at the level of the farms, the cooperative and state agricultural enterprises, the CUASC's /uniform state and cooperative agroindustrial councils/ and the county agricultural directorates and on a national scale. A number of data-processing applications that demonstrate the efficiency of data-processing in agriculture and the necessity of the gradual computerization of agriculture within the framework of the new agrarian revolution planned by the party leadership were presented. At the same time, some duplication also appeared, much less than occurred in other fields in past years, as a result of better coordination and even self-coordination. As a result of the discussions at the above-mentioned conference, there seem necessary a number of data-processing structures at the level of the production place, we might say, connected with farmland for production or with animal husbandry on the farms, then at the level of the uniform councils and at the territorial and county level. We will finalize the pilot data-processing systems, in relation to such structures begun in Arad, Prahova and Constanta Counties, it happening that

everything that proves efficient will be generalized. There is now the possibility of parceling and supervising the soil on homogeneous portions of area.* The parceling of equal areas is no longer justified when the individualized supervision of each parcel of land and each animal on the farm with the help of data processing becomes possible. The distribution of the crops and thus the planning of them should be done by taking into account the possibilities of data processing, which can offer solutions that consider all the technological conditions specific to agriculture, for each individualized parcel of land, through its physical, chemical and biological properties. From this come a number of implications in the management of agriculture that will have to be examined at a certain time. Similar situations of interaction between each economic branch and its own data-processing system that will suggest new solutions in management and organization will appear in the future. This is natural.

To pilot data processing and, thereby, to satisfy efficiently an evolutive architecture, in time and space, also means to correct dynamically the effects of the interaction between the data-processing structure, on the one hand, and the formal state of the management structure and of the economic and social information flows, on the other hand. In this case, it can be said that the results of data processing also give new dimensions and permit new understandings of both the laws of nature and the social laws. We must not fear one law or another, that one thesis or another about economic and social development, about the party, must be changed. This is a law of the social dialectics itself.** Data processing is an element of the new, of the new in the view of the dialectical-materialistic philosophy, of the new in the economy and society in the view of scientific socialism.

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* V. Halmagean and V. Chichernea, a paper at the conference "Data Processing in Agriculture," Arad, 12-13 May 1981.

**Nicolae Ceausescu, "A Speech on the 60th Anniversary of the Founding of the Romanian Communist Party," SCINTEIA, 9 May 1981, p 4.

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